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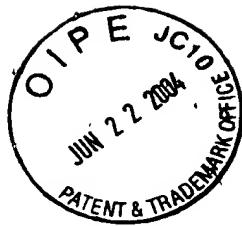
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Tomato Leaf DHS cDNA sequence

CGCAGAAACTCGGGGGCAGTCCTGGTCCGTACATAATCTTGGTCTGCAATAATGGGAGAAGCTCTGAAGTACAGTATCATGGAC
M G E A L K Y S I M D

TCAGTAAGATCGGTAGTTTCAAGAATCCGAAAATCTAGAAGGTTCTTGCACCTAAATCGAGGGCTACGACTTCAATAAAGGCCT
S V R S V V F K E S E N L E G S C T K I E G Y D F N K G V
N Y A E L I K S M V S T G F Q A S N L G D A I A I V N Q

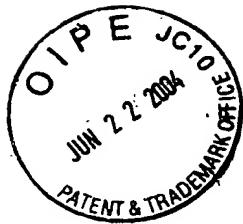
TAACATGCTGAGCTGATCAAGTCCATGGTTCCACTGGTTCCAAAGCATCTTAATCTTGGTACGCCATTGCAATTGTTAATCAA
M L D W R L S H E L P T E D C S E E R D V A Y R E S V T

TGCTAGATTGGAGGCTTACATGAGCTGCCAACGGAGATTGCAGTGAAGAAGAAAGAGATGTTGCATACAGAGAGTCGGTAACC
C K I F L G F T S N L V S S G V R D T V R Y L V Q H R M V

TGCAAAATCTTGGGTTCAACCTTCAACTGTTCTGGTGTAGAGACACTGTCCGCTACCTTGTTCAGCACCGGATGGT
D V V V T T A G G I E E D L I K C L A P T Y K G D F S L
P G A S L R S K G L N R I G N L L V P N D N Y C K F E N W

TGATGTTGGTTACTACAGCTGGTGGTATTGAAGAGGATCTCATAAAGTGCCTGGCACCAACCTACAAGGGGGACTTCTCTTAC
I I P V F D Q M Y E E Q I N E K V L W T P S K V I A R L G

FIG. 1A



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TAAAGAAATTAAATGAAACCTCATACTGTATTGGCTTACAAGAACCGATTCCGTCTGGCTTGACGGATGGAT
K E I N D E T S Y L Y W A Y K N R I P V F C P G L T D G

CACTTGGTACATGCTATACTTCCATTCTTCAAAAAGGGTATCCAGATAATCCAGATCTTAATCCTGGTCTAGTCATAGACATT
S L G D M L Y F H S F K K G D P D N P D L N P G L V I D I

GTAGGAGATATTAGGGCCATGAATGGTGAAGCTGTCCATGCTGGTTGAGGAAGACAGGAATGATTATACTGGTGGAGGGCTGCC
V G D I R A M N G E A V H A G L R K T G M I I L G G L P

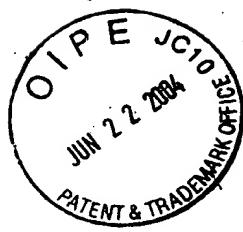
TAAGCACCAGTTGCAATGCCAATATGATGCGCAATGGTGCAGATTGGCGTCTTCATTAACACCGCACAAAGAGTTGATGGTA
K H H V C N A N M M R N G A D F A V F I N T A Q E F D G

GTGACTCTGGTGCCTGTATGAAGCTGTATCATGGGAAAGATAACGTGGTGGTGCAGACTGTGAAGGGTGCATTGTGATGCA
S D S G A R P D E A V S W G K I R G G A K T V K V H C D A

ACCATTGCATTTCCCATATTAGTAGCTGAGACATTGCAGCTAAGAGTAAGGAATTCTCCAGATAAGGGTGCACATTGTTGAACACATT
T I A F P I L V A E T F A A K S K E F S Q I R C Q V

GAGGAAGCTGCTCCGACCACACATATGAATTGCTAGCTTGTAGCTTGAAGCCAACTTGTCTAGTGTGCAGCACCATTCTGCAAA
CTGACTAGAGAGCAGGGTATATCCTCTACCCGAGTTAGACGACATCCTGTATGGTCAAATTAAATTATTTCTCCCTTCACA
CCATGTTATTAGTTCTCTCCCTCTCGAAAGTGAAGAGCTTAGATGTTCATGGTTGAATTATGTTGGAGGGTGGTGTGATAACT
GACTAGTCCTCTACCATATAGATAATGTAATCCTTGACTATGAGATTGGTGTGTTGATACCAAGGAAAATGTTTATTGG
AAAACAATTGGATTTTTAATTATTTCTTGTTT

FIG. 1B



Arabidopsis DeoxyHypusine Synthase
(DHS) Predicted Sequence

GAACTCCAAAACCTCTACTACTACACTTCAAGATCCAAGGAAATCAATTTCGAGCAACATGG
 M
 AGGATGATCGTGTTCCTCGGTTCACTCAACAGTTCAAGAGAATCCGAATCATTGGAAGGAAAGTGT
 E D D R V F S S V H S T V F K E S E S L E G K C
 GATAAAATCGAAGGATACGATTCAATCAAGGAGTAGATTACCCAAAGCTTATGCGATCCATGCTCAC
 D K I E G Y D F N Q G V D Y P K L M R S M L T T
 CGGATTCAGCCTCGAATCTCGGCGAAGCTATTGATGTCGTCAATCAAATGGTCGTTCTCGAATTCA
 G F Q A S N L G E A I D V V N Q M
 CAAAAATAAAATTCTCTTTGTTCTTGGGTGAATTAGTAATGACAAAGAGTTGAATT
 F E F
 TGTATTGAAGCTAGATTGGAGACTGGCTGATGAAACTACAGTAGCTGAAGACTGTAGTGAAGAGGAGAAGA
 V L K L D W R L A D E T T V A E D C S E E E K
 ATCCATCGTTAGAGAGTCTGTCAAGTGTAAAATCTTCTAGGTTCACTCAAATCTGTTCTGCT
 N P S F R E S V K C K I F L G F T S N L V S S G
 GTTAGAGATACTATTGTTATCTTGTTCAGCATCATATGGTTGTGATTTCGTTATCACCCCTGCTTT
 V R D T I R Y L V Q H H M
 TTATAGATGTTAAAATTTCGAGCTTAGTTGATTCAATGGTTCTGCAGGTTGATGTTAGTCA
 V D V I V
 CGACAACGGTGGTGTGAGGAAGATCTCATAAAATGCCCTGCACCTACATTAAAGGTGATTCTCTCTA
 T T T G G V E E D L I K C L A P T F K G D F S L
 CCTGGAGCTTATTAAGGTCAAAGGGATTGAACCGAATTGGGAATTGCTGGTCTTAATGATAACTACTG
 P G A Y L R S K G L N R I G N L L V P N D N Y C
 CAAGTTGAGGATTGGATCATTCCATCTTGCAGGAGATGTTGAAGGAACAGAAAGAAGAGGTATTGCTT
 K F E D W I I P I F D E M L K E Q K E E
 ATCTTCTCTTATATGATTGAGATGATTCTGTTGTGCGTCACTAGTGGAGATAGATTTGATTCTC
 TCTTGATCATTGACTTCGTTGGTGAATCTCTTCTGGTTCTGTTAGAATGTTGACTCTGCT
 N V L W T
 CTTCTAAACTGTTAGCACGGCTGGAAAAAGAAATCAACAATGAGAGTTCATACCTTATTGGCATA
 P S K L L A R L G K E I N N N E S S Y L Y W A Y K
 GTATCCAAAATTAAACCTTTAGTTTAATCATCCTGTGAGGAACCTGGGATTAAATTCTCCGCT
 TCTTGTTGGTGTAGATGAATATTCCAGTATTCTGCCAGGGTTAACAGATGGCTCTGGGGATATG
 M N I P V F C P G L T D G S L G D M
 CTGTATTTCACTCTTCGTAACCTCTGGCCTCATCATCGATGTTAGTACAAGGTACTCTTTACTCAATA
 L Y F H S F R T S G L I I D V V Q
 AGTCAGTGTGATAAAATATTCTGCTACATCTAGTCAGGAATTGTAACTAGTAGTCATTGAGCTTT
 CCAATTCAACGGACTTACTGTAAGTTGATATCTAAAGGTTCAAACGGGAGCTAGGAGAATAGCATAG
 GGGCATTCTGATTAGGTTGGGCACTGGGTAAGAGTTAGAGAATAATACTTGTAGTTGTTATCA
 AACTCTTGATGGTTAGTCTCTGGTAATTGAATTATCACAGTGTATGGCTTGAACCAGTTAAT
 GTTTATGAACAGATATCAGAGCTATGAACGGCGAAGCTGTCATGCAAATCCTAAAGACAGGGATGAT
 D I R A M N G E A V H A N P K K T G M I
 AATCCTTGGAGGGGGCTGCCAAAGCACCACATATGTAATGCCAATATGATGCGCAATGGTGCAGATTACG
 I L G G G L P K H H I C N A N M M R N G A D Y
 CTGTATTATAAACACCGGGCAAGAATTGATGGGAGCGACTCGGGTGCACGCCCTGATGAAGCCGTGCT
 A V F I N T G Q E F D G S D S G A R P D E A V S
 TGGGGTAAATTAGGGTTCTGCTAAACCGTTAAGGCTGCTTTAAATTCTCACATCCTAAATTATA
 W G K I R G S A K T V K V C F L I S S H P N L Y
 TCTCACTCAGTGGTTTGAGTACATATTAAATTGGATCATTCTGCAGGTATACTGTGATGCTACCA
 L T Q W F
 GCCCTCCATTGTTGGTGCAGAAACATTGCCACAAAGAGAGACCAACCTGTGAGTCTAAGACTTAAGA
 ACTGACTGGTCGTTGGCCATGGATTCTAAAGATCGTGTGCTTTGATTTACACTGGAGTGACCATAT
 AACACTCCACATTGATGTCGTGACCGAATTGTCCTTGCAGATTGACTTTAGTTCTCTCAACCT
 AAAATGATTGCAAGATTGTTGTTAAACACAAAGAGTCTTGAGTCAATAATCCTTGCCTTATAA
 AATTATTCAAGTCCAACACACATTGTGATTCTGTGACAAGTCTCCGTTGCCTATGTTCACTCTGCG



MEDDRVFSSVHSTVKESESLEGKCDKIEGYDFNQGVDPYKLMRSMLTTGFQASNLEAIDVNQMFVFVULKLDWRLADETTVAEDCSEEKNPSFRESVCKKIFLGFITSNLVSSGVRDRTIRYLQVHHMWDVIVTTGGVEEDIKCLAPTFKGDFSLPGAYLRSKGLNRIGNLLVPDNDYCKFEDWIPIFDEMILKEQKEENVLWTPSKLLARLGKEINNESSYLYWAYKMNIPVFCPGLTDGSLGDMLYFHFSRTSGLIIDWVQDIRAMNGEAVHANPKKTGMILGGGLPKHICNANMMRNGADYAVFINTGQEFDGSDSGARPDEAVSWGKIRGSAKTVKVCFLISSHPNLYLTQMF

FIG. 2B

GGTGGTGGAGGAAGATCTCATAAAATGCCACCTACATTTAAAGGTGATTCTACACTGGAGCTTACCTGGAGCTTAAAGTTAAGGTCAAGGGATTGAACCGAAATTGGGAATTGGCTGGTTCCAATGATAACTACTGCAAGTTGAGGATTGGATCATTCCAATCTTGACCGAGATGTTGAAGGAACAGAAAGAAGAATGTTGACTCCCTCTAAACACTGTTAGCACGGCTGGGAAAGAAATCAACAAATGAGAGTTCATACCTTATTGGGCATACAAAGATGAATATTCCAGTATTCTGCCAGGGTTAACAGATGGCTCTTAGGGATATGCTGTATTCTCACTCTTCTGTAACCTCTGGCTCATCATCGATGTAGTACAAGATATCAGAGCTATGAAACGGCGAAGCTGTCCATGCCAAATCCTAAAAAGACAGGGATGATAATCCTGGAGGGCTTGCCAAAGGACACATAATGCAATATGATGCCAATGGTGCAGATTACGCTGTATTATAAAACACGGGCAAGAATTGGATGGAGCGACTCGGGTGCACGCCCTGTGAAGC

FIG. 2C

GGVEEDIKCLAPTFKGDFSLPGAYLRSKGLNRIGNLLVPNDNYCKFEDWIPIFDEMILKEQKEENVLWTPSKLLARLGKEINNESSYLYWAYKMNIPVFCPGLTDGSLRDMLYFHFSRTSGLIIDWVQDIRAMNGEAVHANPKKTGMILGGGLPKHICNANMMRNGADYAVFINTGQEFDGSDSGARPDE

FIG. 2D



Multiple DHS Sequence Alignments of Human, *Arabidopsis*, Tomato, Yeast, *Neurospora* (Fungi), and *Methanococcus* (Archaeobacteria)

3
G
E



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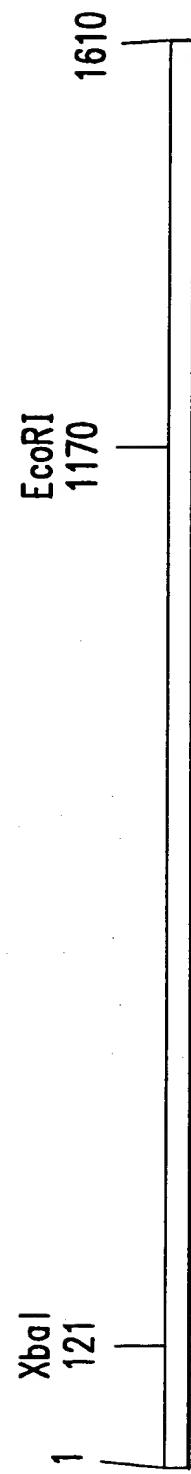


FIG.4

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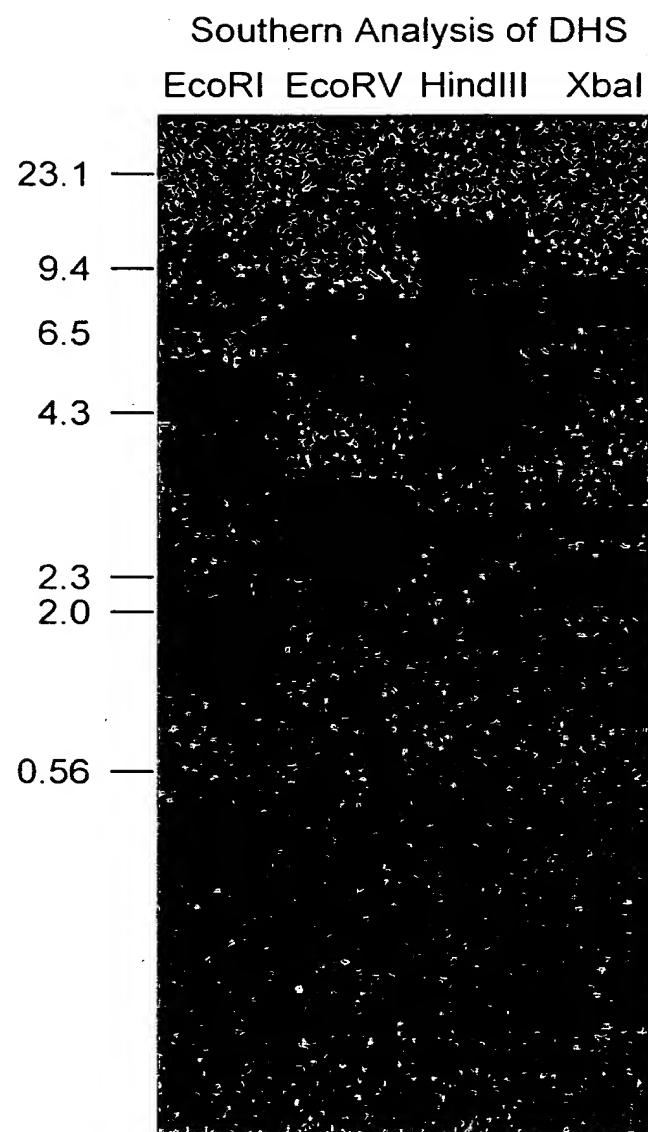
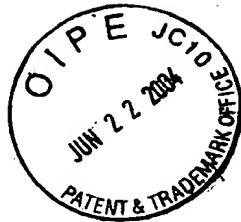


FIG.5



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Northern analysis of DHS on
tomato flowers

Blossom
and
Bud Senescence

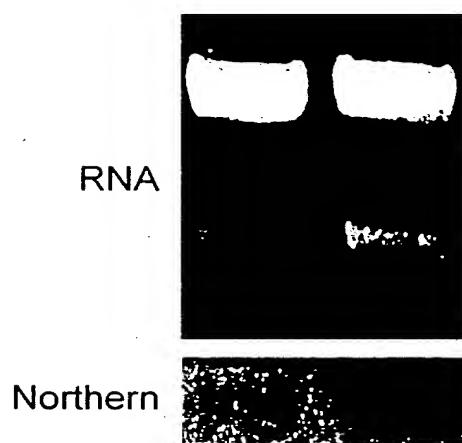


FIG.6



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NORTHERN ANALYSIS OF DHS
ON DEVELOPMENTAL STAGES OF
TOMATO FRUIT

BREAKER PINK

RIPE
(RED)

NORTHERN
BLOT



FIG. 7



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Northern Analysis of DHS – 2M
Sorbitol treated Tomato Leaves

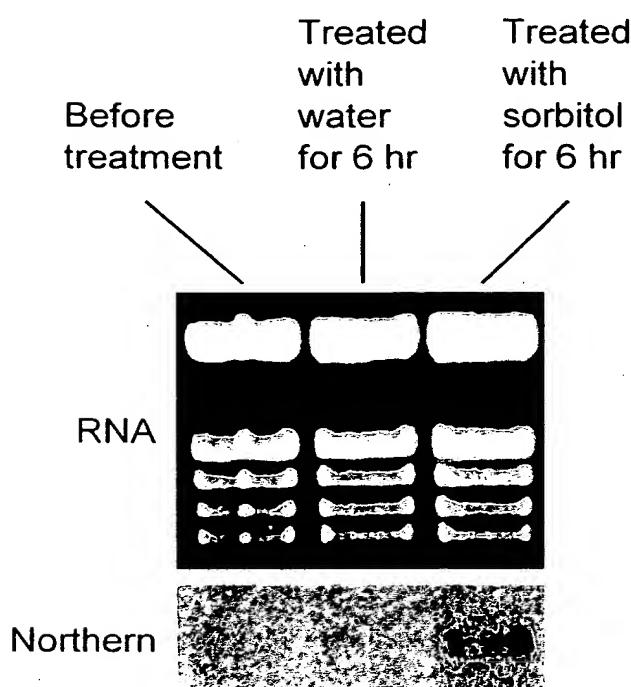
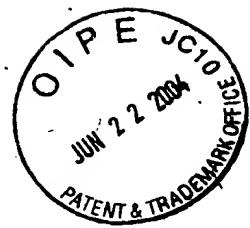


FIG.8



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NORTHERN ANALYSIS OF DHS
TOMATO LEAF CHILLING EFFECTS

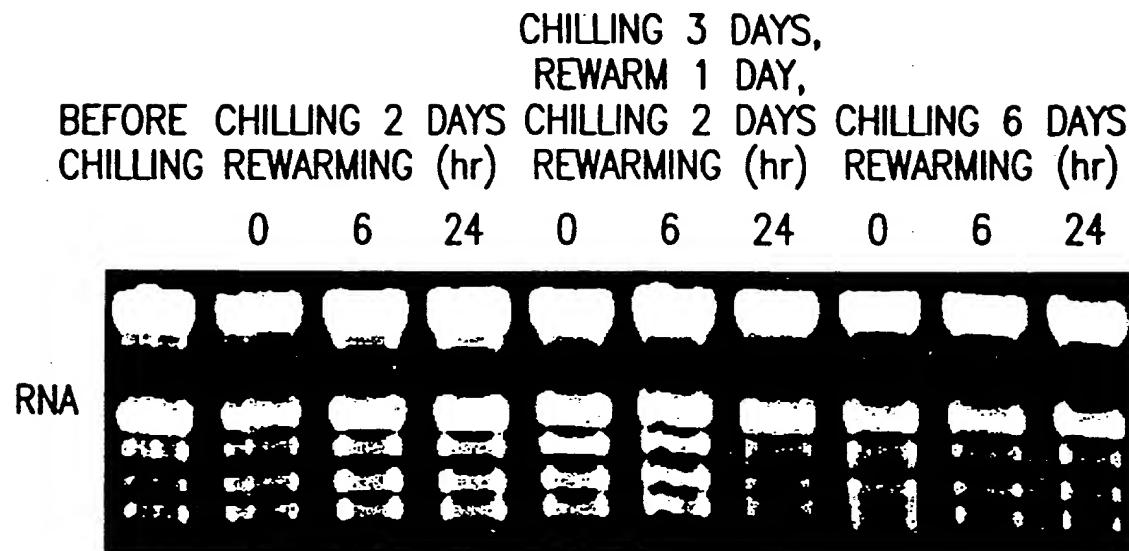


FIG.9A

Northern

FIG.9B

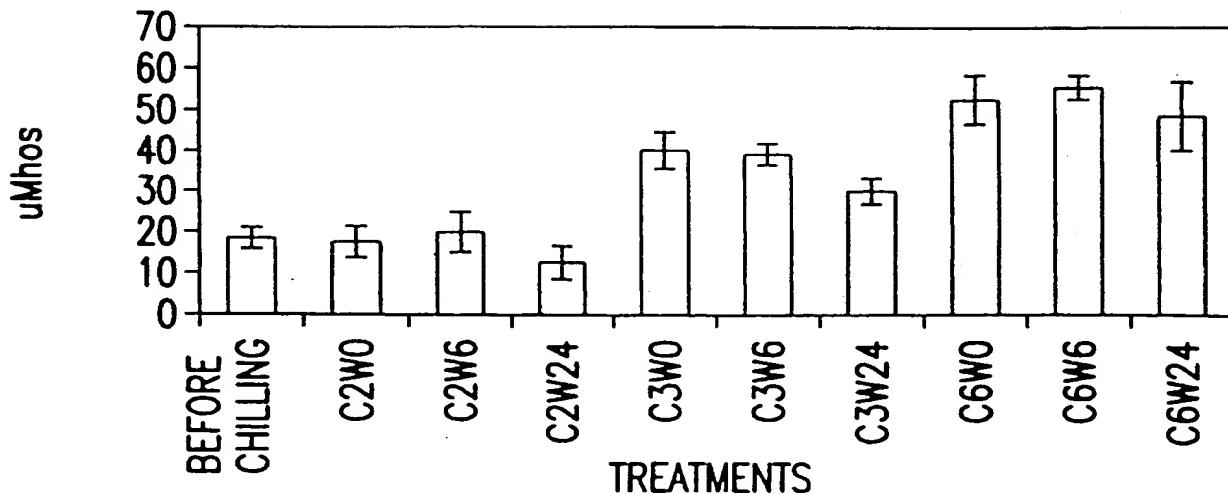


FIG.9C



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Canation DHS cDNA Sequence

GTCATTACAATGCATAGGATCATTGCACATGCTACCTCCTCATTGCACTTGAGCTGCCATA
CTTTTGTGTTTGACGTTGATAATAACTATGAAAATATTATGTTTGTGTTG
GTGTTTGAGTTGTTGATAAGCAGAACCCAGTTGTTACACTTTACCTTACCAATTGAACTA
CTGCAATTCTAAAACCTTGTGTTACATTAACTTCAAAAGATTGAGTTCAGCATAGGAAAA
AGGATGGAGGATGCTAATCATGATAGTGTGGCATCTGCGCACTCTGCAGCATTCAAAAAGTCG
M E D A N H D S V A S A H S A A F K K S
GAGAATTAGAGGGAAAAGCGTTAAGATTGAGGGTTATGATTAACTCAAGGTGAAACTAT
E N L E G K S V K I E G Y D F N Q G V N Y
TCCAAACTCTGCAATCTTCGCTCTAATGGGTTCAAGCCTCGAATCTGGAGATGCCATT
S K L L Q S F A S N G F Q A S N L G D A I
GAAGTAGTTAACATATGCTAGATTGGAGTCTGGCAGATGAGGCACCTGTGGACGATTGTAGC
E V V N H M L D W S L A D E A P V D D C S
GAGGAAGAGAGGGATCCTAAATTCAAGAGAATCTGTGAAGTGCAAAGTGTCTGGCTTACT
E E E R D P K F R E S V K C K V F L G F T
TCAAATCTTATTCCTCTGGTGTCTGACACAATTGGTATCTGTCGAACATCATGGTT
S N L I S S G V R D T I R Y L V Q H H M V
GACGTGATAGTAACGACAACCGGAGGTATAGAAGAAGATCTAATAAAAGGAAGATCCATCAAG
D V I V T T T G G I E E D L I K G R S I K
TGCCTTGACCCACTTCAAAGGCATTGGCTTACCAAGGAGCTCAATTACGCTCAAAGGG
C L A P T F K G D F A L P G A Q L R S K G
TTGAATCGAATTGGTAATCTGTTGGTCCGAATGATAACTACTGTAAATTGAGGATTGGATC
L N R I G N L L V P N D N Y C K F E D W I
ATTCCAATTAGATAAGATGTTGGAAGAGCAAATTTCAGAGAAAATCTTATGGACACCATCG
I P I L D K M L E E Q I S E K I L W T P S
AAGTTGATTGGTCGATTAGGAAGAGAAATAACGATGAGAGTTCATACCTTACTGGCCTTC
K L I G R L G R E I N D E S S Y L Y W A F
AAGAACAAATTCCAGTATTTGCCAGGTTAACAGACGGCTCACTCGGAGACATGCTATAT
K N N I P V F C P G L T D G S L G D M L Y
TTTCATTCTTCGCAATCCGGGTTAACGTCGATGTTGTGCAAGATATAAGAGCAGTAAAT
F H S F R N P G L I V D V V Q D I R A V N
GGCGAGGCTGTGCACGCAGCGCTAGGAAACAGGCATGATTACTCGGTGGAGGGTTGCCT
G E A V H A A P R K T G M I I L G G G L P
AAGCACCACATCTGCAACGCAAACATGATGAGAAATGGCGCCGATTATGCTGTTTCAAC
K H H I C N A N M M R N G A D Y A V F I N
ACTGCCGAAGAGTTGACGGCAGTGTGATTCTGGTGCTGCCCGATGAGGCTATTATGGGC
T A E E F D G S D S G A R P D E A I S W G
AAAATTAGCGGATCTGCTAAGACTGTGAAGGTGCATTGTGATGCCACGATAGCTTCCCTCA
K I S G S A K T V K V H C D A T I A F P L
CTAGTCGCTGAGACATTGCAAGAAAAAGAGAAAAAGAGAGGAAGAGCTGTTAAAACCTT
L V A E T F A A K R E K E R K S C
GATTGTTGAAAATCTGTGTTACAGTCGAAATGCTTGTGAAATTGACTTGATCTTA
TCATTTCAATGTGTTACCTTGAAAATGTTGGTAATGAAACATCTCACCTCTTATACAACA
TTGTTGATCCATTGACTCCGTATCTGTAATTGGAAAAAAACCGTCTATTGTTACGA
GAGAGTACATTGAGGTTAGGATTTGTGCGATGCAAATGCTGGTTATCCCT
TGAAAAAAAAAAAAAA

(1384 bps, not include Poly A tail and 5'end nocoding region.
373 Amino Acid.)

FIG. 10



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Northern Analysis of WT AT Aging Leaves

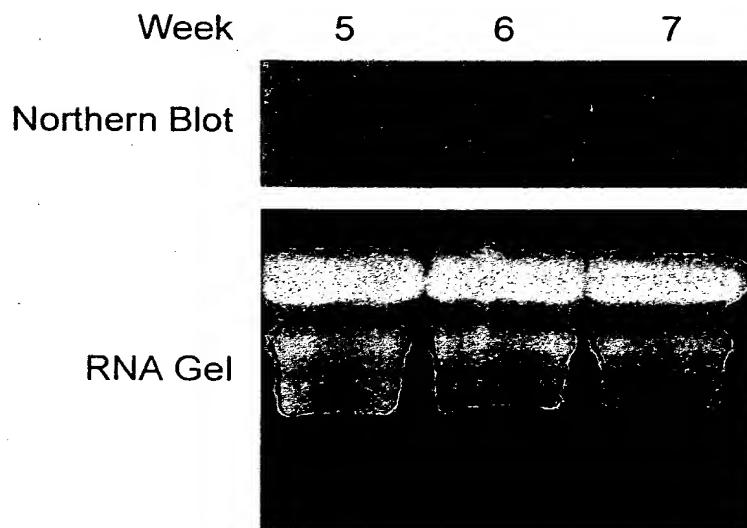


FIG.11



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Northern Analysis of Canation Petal (*In Situ*) DHS

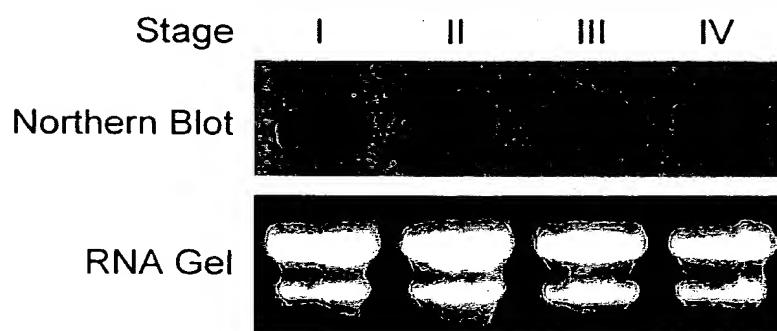


FIG.12



Tomato eif5A

AAAGAATCCTAGAGAGAGAAAGGAATCCTAGAGAGAGAAGCATGTCGGACGAAGAACAC
M S D E E H
CATTGGAGTCAAAGGCAGATGCTGGTGCCTCAAAAACTTCCACAGCAAGCTGGAACC
H F E S K A D A G A S K T F P Q Q A G T
ATCCGTAAGAATGGTTACATCGTTATCAAAGGCCGTCCCTGCAAGGTTGAGGTCTCC
I R K N G Y I V I K G R P C K V V E V S
ACTTCAAAAACGGAAAACACGGACATGCTAAATGTCACTTGTTGGCAATTGACATTTTC
T S K T G K H G H A K C H F V A I D I F
AATGGAAAGAAACTGGAAAGATATCGTTCCGTCCTCCCACAATTGATGTGCCACATGTT
N G K K L E D I V P S S H N C D V P H V
AACCGTACCGACTATCAGCTGATTGATATCTCTGAAGATGGTTTGTCTCACTCTTACT
N R T D Y Q L I D I S E D G F V S L L T
GAAAGTGGAAACACCAAGGATGACCTCAGGCTCCACCGATGAAAATCTGCTGAAGCAG
E S G N T K D D L R L P T D E N L L K Q
GTTAAAGATGGGTTCCAGGAAGGAAAGGATCTTGTGGTGTCTGTTATGTCTGCGATGGC
V K D G F Q E G K D L V V S V M S A M G
GAAGAGCAGATTAACGCCGTTAAGGATGTTGGTACCAAGAATTAGTTATGTCATGGCAGC
E E Q I N A V K D V G T K N
ATAATCACTGCCAAGCTTAAGACATTATCATATCCTAATGTGGTACTTGATATCACT
AGATTATAAACTGTGTTATTGCACTGTTCAAAACAAAAGAAAGAAAACGCTGTTATGG
CTAGAGAAAGTATTGGCTTGAGCTTTGACAGCACAGTTGAACATGTGAAAATTCTAC
TTTTTTTTTTGGGTAAGACTGCTCGTTAATGTTGCAAAAAAAAAAAAAAA

764 bps, not: including Poly(A) tail; 160 amino acids

FIG. 13



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Carnation-F5A

CTCTTTACATCAATCGAAAAAAATTAGGGTTCTTATTTAGAGTGAGA
GGCGAAAAATCGAACGA T GTCGGACGACGATCACCATTCGAGTCATCGG
M S D D D H H F E S S A
CCGACGCCGGAGCATCCAAGACTTACCCCTAACAAAGCTGGTACAATCCGC
D A G A S K T Y P Q Q A G T I R
AAGAGCGGTACATCGTCATCAAAAATCGCCtTGCAAGGtGGTTGAGGT
K S G H I V I K N R P C K V V E V
TTCTACCTCCAAGACTGGCAAGCACGGTCATGCCAAATGTCACTTGTTG
S T S K T G K H G H A K C H F V A
CCATTGACATTTCAACGGCAAGAAGCTGGAAGATATTGTCCCCCTCATCC
I D I F N G K K L E D I V P S S
CACAAATTGTGATGTTCCACATGTCAACCGTGTGACTACCAGCTGCTTGA
H N C D V P H V N R V D Y Q L L D
TATCACTGAAGATGGCTTCTTAGTCTGCTGACTGACAGTGGTACACCA
I T E D G F V S L L T D S G D T K
AGGATGATCTGAAGCTTCCGTGATGAGGCCCTGTGAAGCAGATGAAG
D D L K L P A D E A L V K Q M K
GAGGGATTGAGGCAGGGAAAGACTTGAATTCTGTCAGTCATGTGTGCAAT
E G F E A G K D L I L S V M C A M
GGGAGAAGAGCAGATCTGCGCCGTCAAGGACGTTAGTGGTGGCAAGT A G A
G E E Q I C A V K D V S G G K
AGCTTTGATGAATCCAATACTACCGCGGTGAGTTGAAGCAATAGTAATC
TCGAGAACATTCTGAACCTTATATGTTGAATTGATGGTGCTTAGTTGTT
TTGGAAATCTCTTGCAATTAGTTGACCAAATCAATGGATGTAATGTC
TTGAATTGTTTATTTTGTGATGTTGCTGtGATTGCATTATGCA
TTGTTATGAGTTATGACCTGTTAACACAAGGTTGGTAAAAAAA
AAAAAAA

790 bps, 160 amino acids

FIG. 14



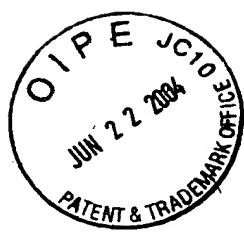
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Arabidopsis F5A

CTGTTACCAAAAAATCTGTACCGCAAAATCCTCGTCAAGCTCGCTGCTGCAACCATGTC
M S
CGACGAGGAGCATCACTTGAGTCCAGTGACGCCGGAGCGTCCAAAACCTACCCCTCAACA
D E E H H F E S S D A G A S K T Y P Q Q
AGCTGGAACCATCCGTAAGAATGGTTACATCGTCATCAAAAATCGTCCCTGCAAGGTTGT
A G T I R K N G Y I V I K N R P C K V V
TGAGGTTTCAACCTCGAAGACTGGCAAGCATGGTCATGCTAAATGTCATTTGTAGCTAT
E V S T S K T G K H G H A K C H F V A I
TGATATCTTACCACGCAAGAAACTCGAAGATATTGTTCTTCTTCCCACAATTGTGATGT
D I F T S K K L E D I V P S S H N C D V
TCCTCATGTCAACCGTACTGATTATCAGCTGATTGACATTCTGAAGATGGATATGTCAG
P H V N R T D Y Q L I D I S E D G Y V S
TTTGTGACTGATAACGGTAGTACCAAGGATGACCTTAAGCTCCCTAATGATGACACTCT
L L T D N G S T K D D L K L P N D D T L
GCTCCAACAGATCAAGAGTGGTTGATGATGGAAAAGATCTAGTGGTAGTGTAATGTC
L Q Q I K S G F D D G K D L V V S V M S
AGCTATGGGAGAGGAACAGATCAATGCTCTTAAGGACATCGGTCCCAAGTGAGACTAAC
A M G E E Q I N A L K D I G P K
AAGCCTCCCTTGTATGAGATTCTCTTCTGTAGGCTCCATTACTCGTCGGAGA
TTATCTTGTTTGGTTACTCCTATTTGGATATTAAACTTTGTTAATAATGCCATC
TTCTCAACCTTCTTAGATGGTTTATACTTCTTCT

754 bps, not including Poly(A) tail; 158 amino acids

FIG. 15



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Northern Analysis of WT AT DHS and F5A

Aging Leaves

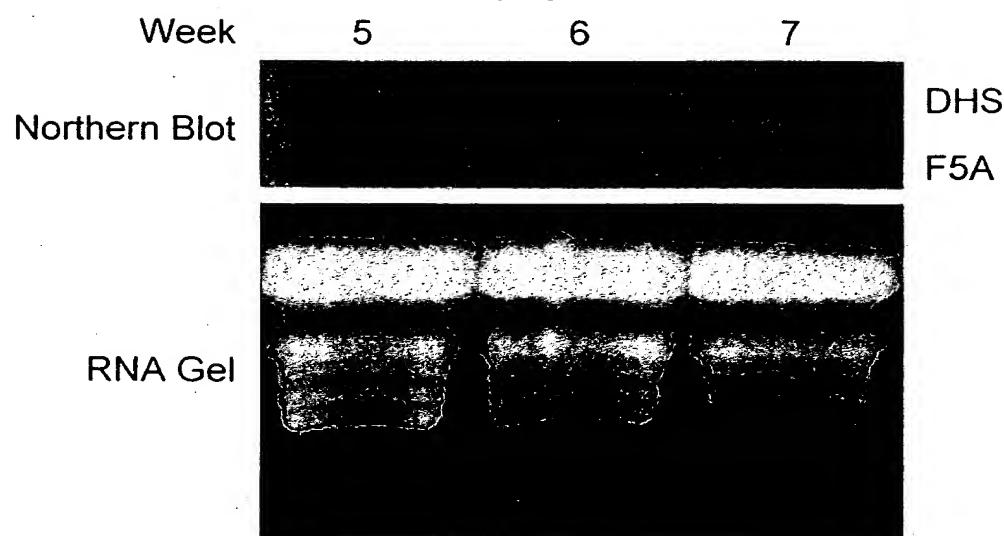


FIG.16



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Northern Analysis of Ripening Tomato Fruit

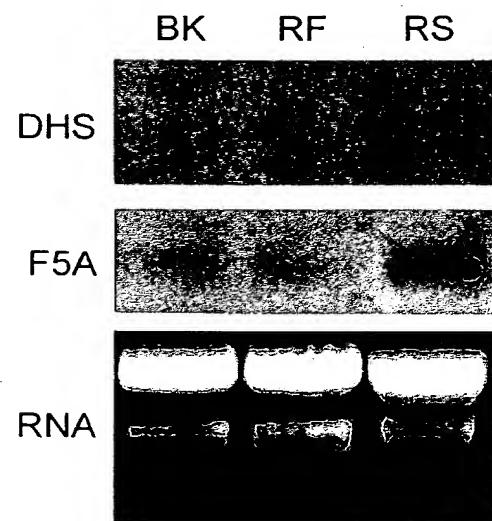


FIG. 17



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Northern Analysis of sorbitol-treated tomato leaves

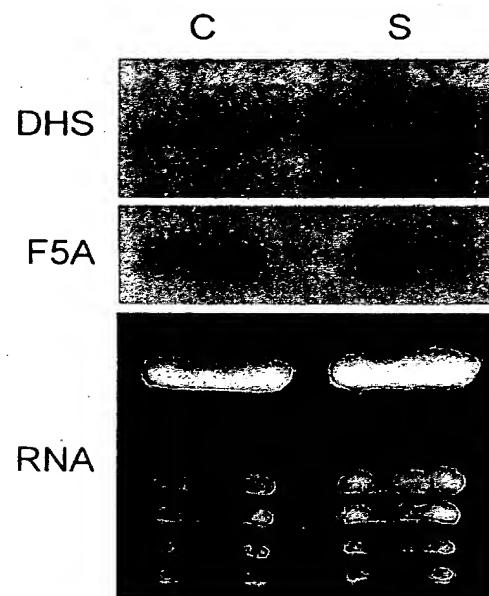


FIG.18



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Northern Analysis of Tomato Flowers

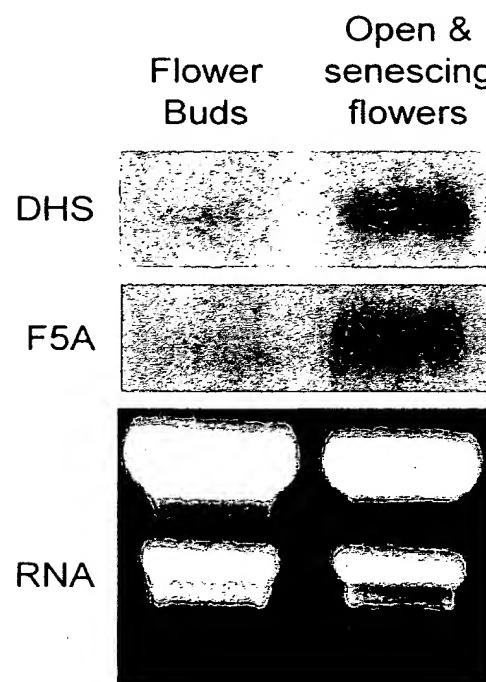


FIG.19



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Northern Analysis of chill-injured tomato leaves

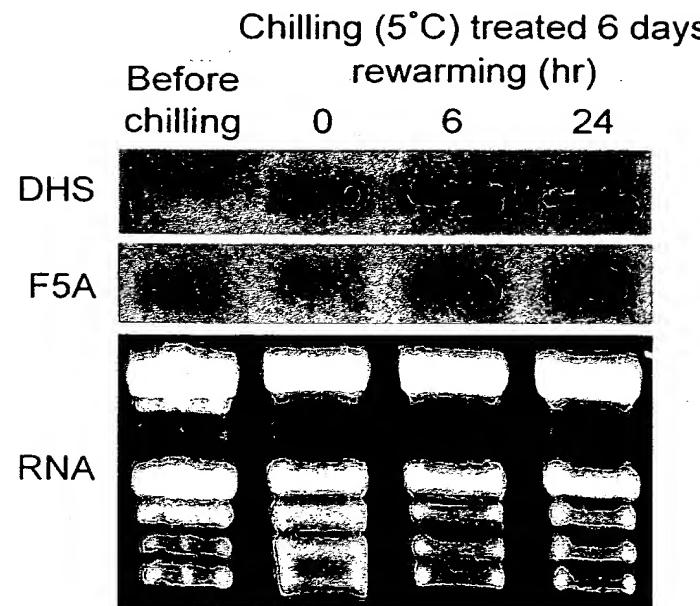
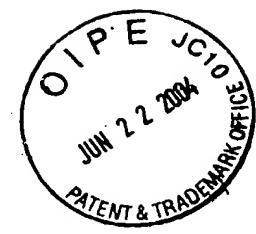


FIG.20



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3.1 Weeks

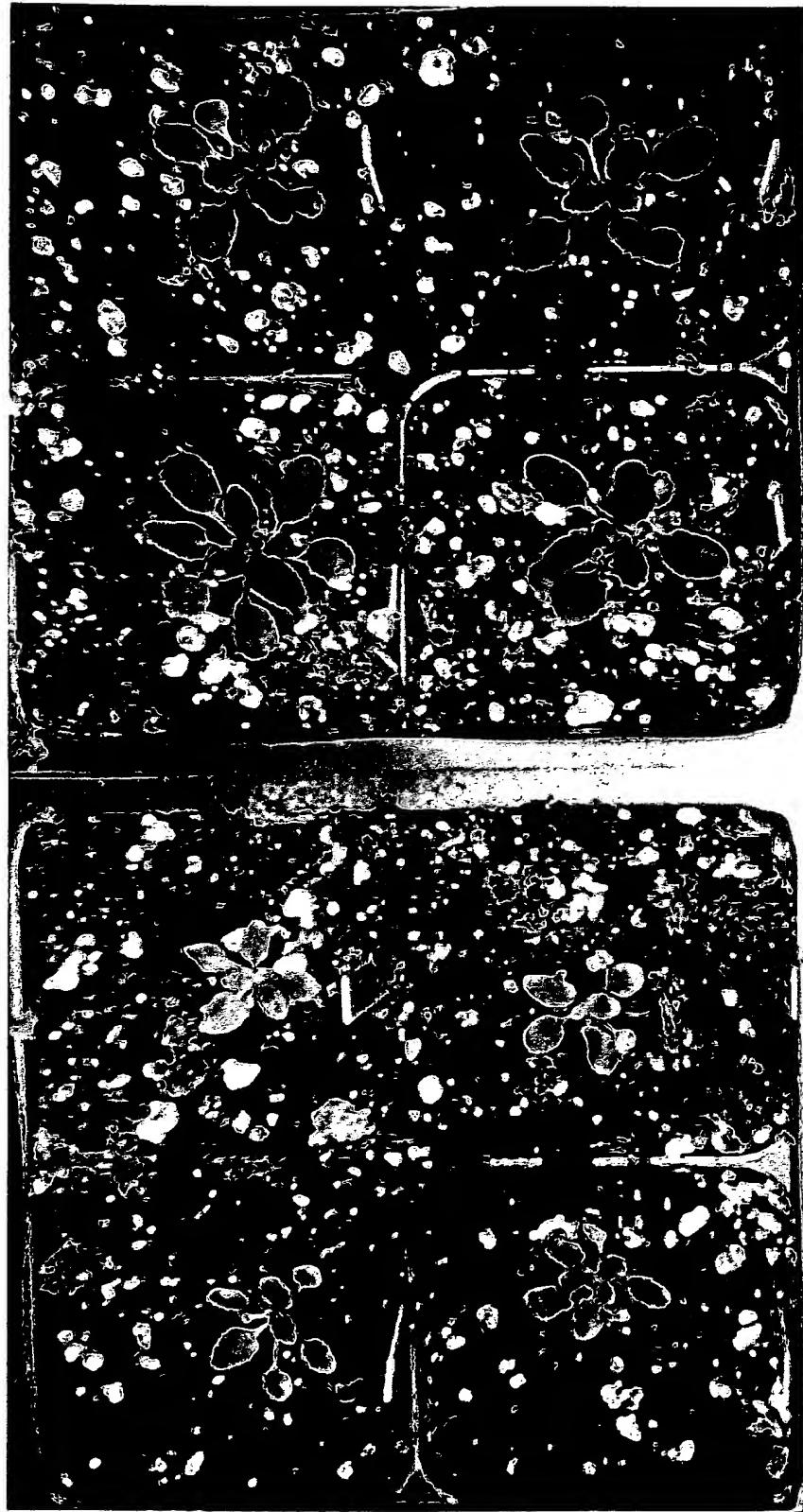


FIG. 21

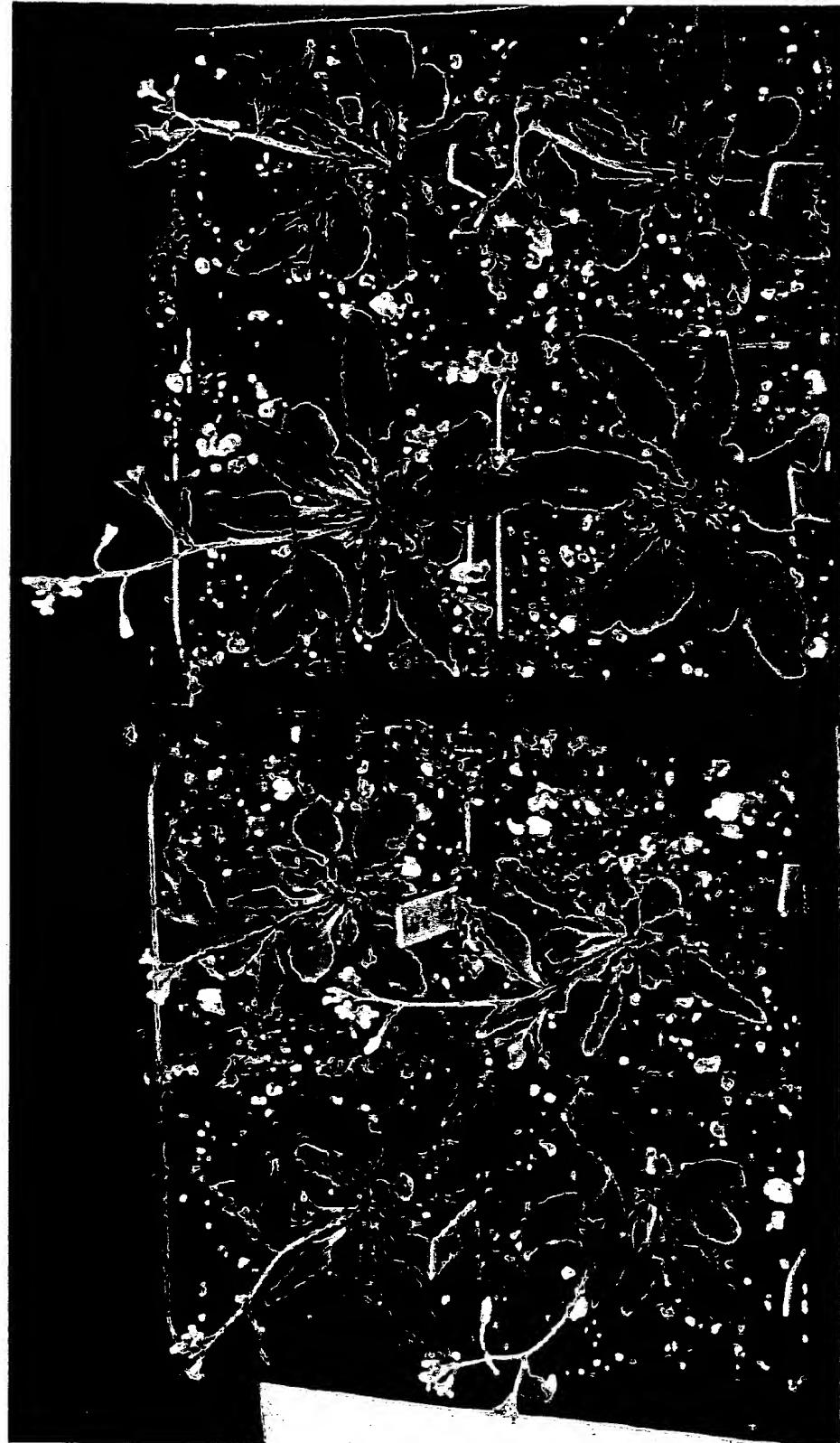
α-3'DHS # 3

Wild-Type



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4.6 Weeks



Wild-Type

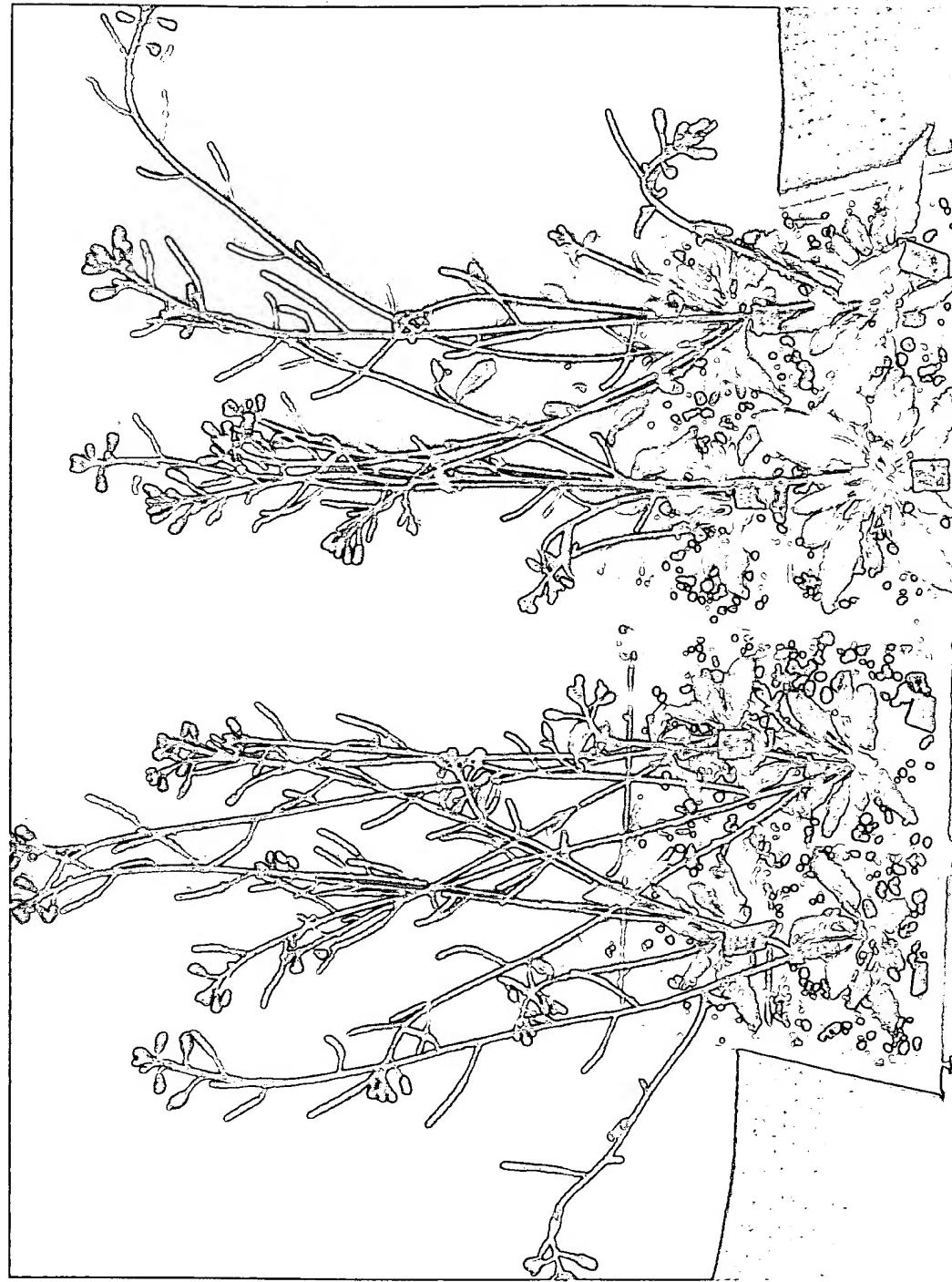
α -3'DHS #3

FIG. 22

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5.6 Weeks



α -3'DHS #7

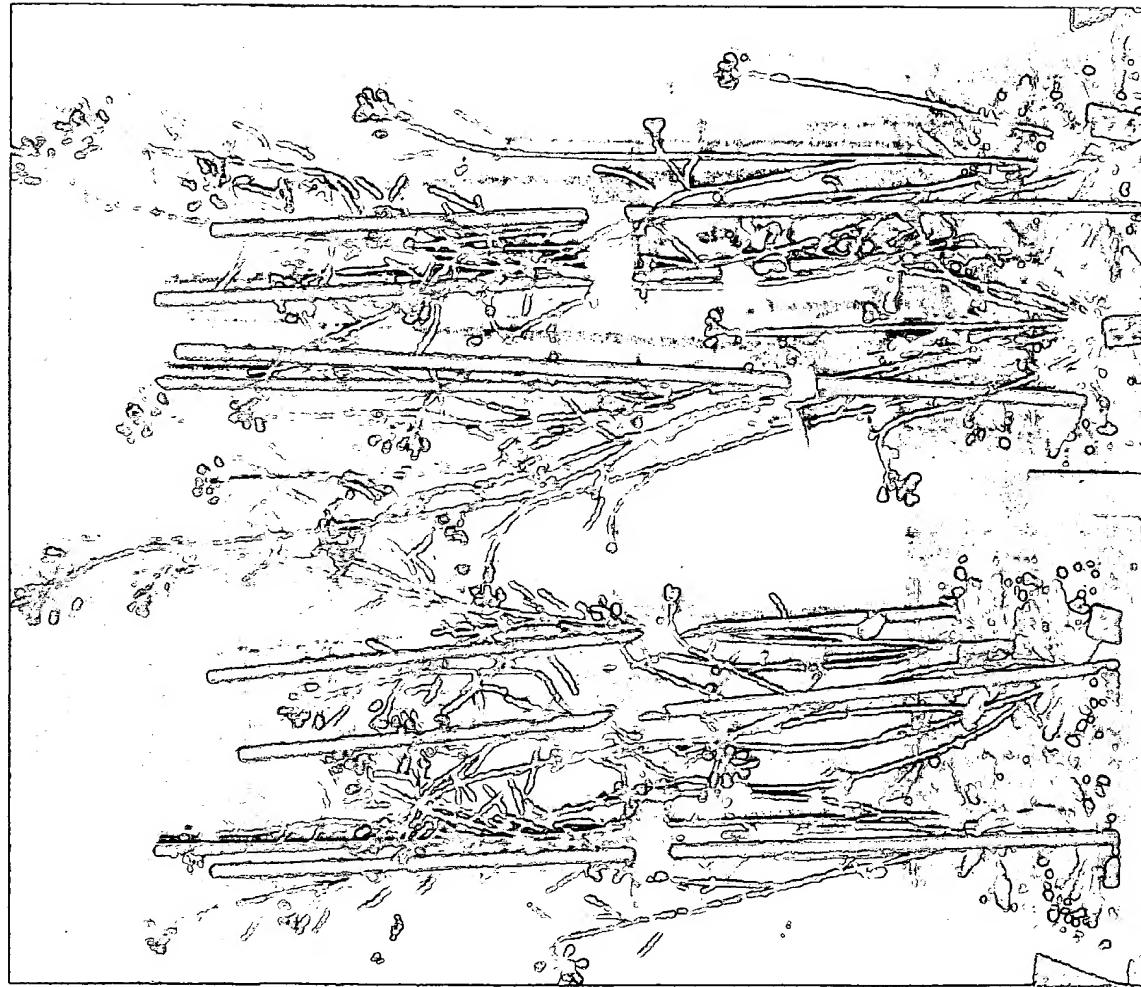
Wild-Type

FIG. 23



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6.1 Weeks



Wild-Type
 α -3'DHS # 7

FIG. 24



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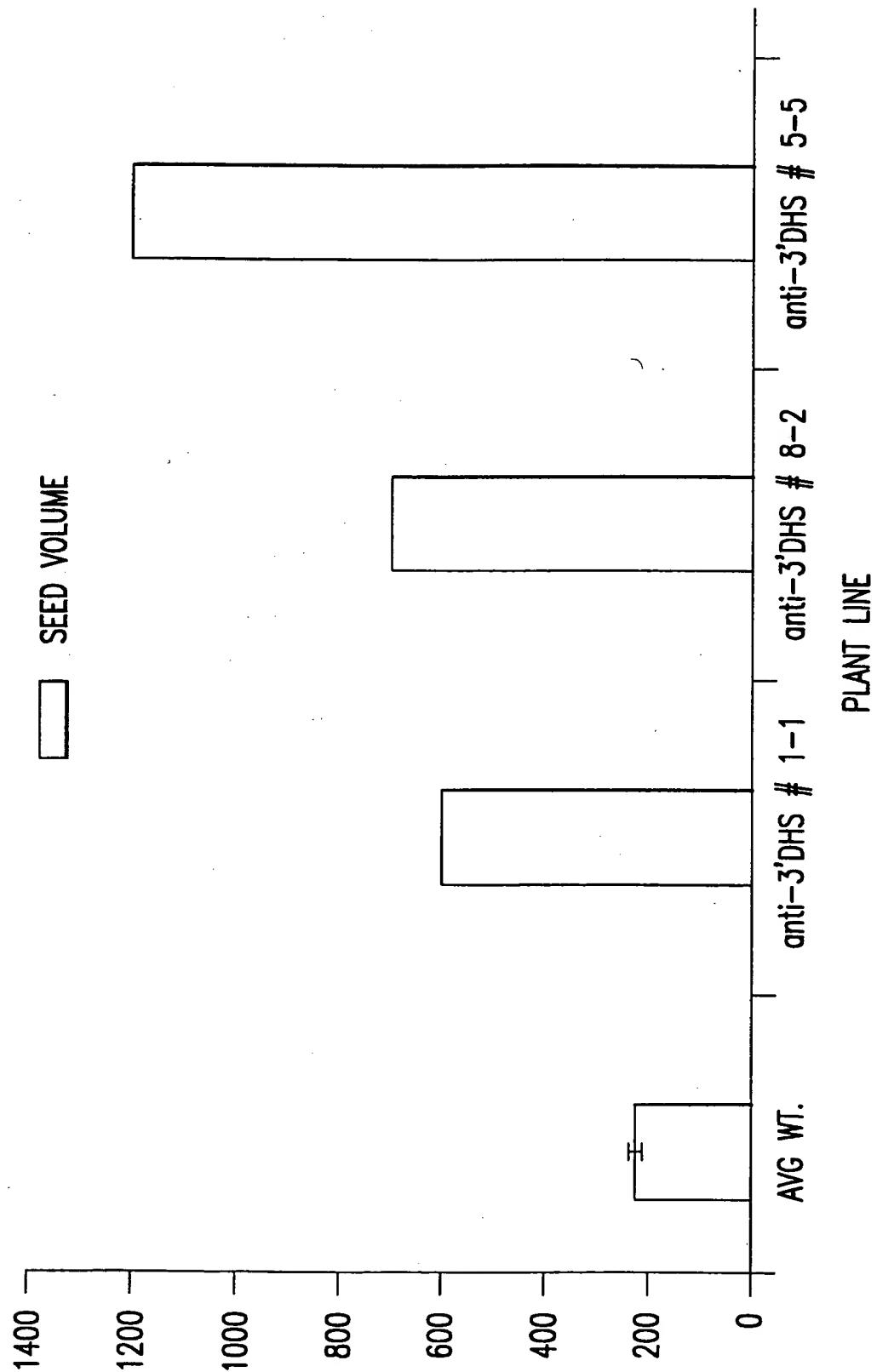


FIG. 25



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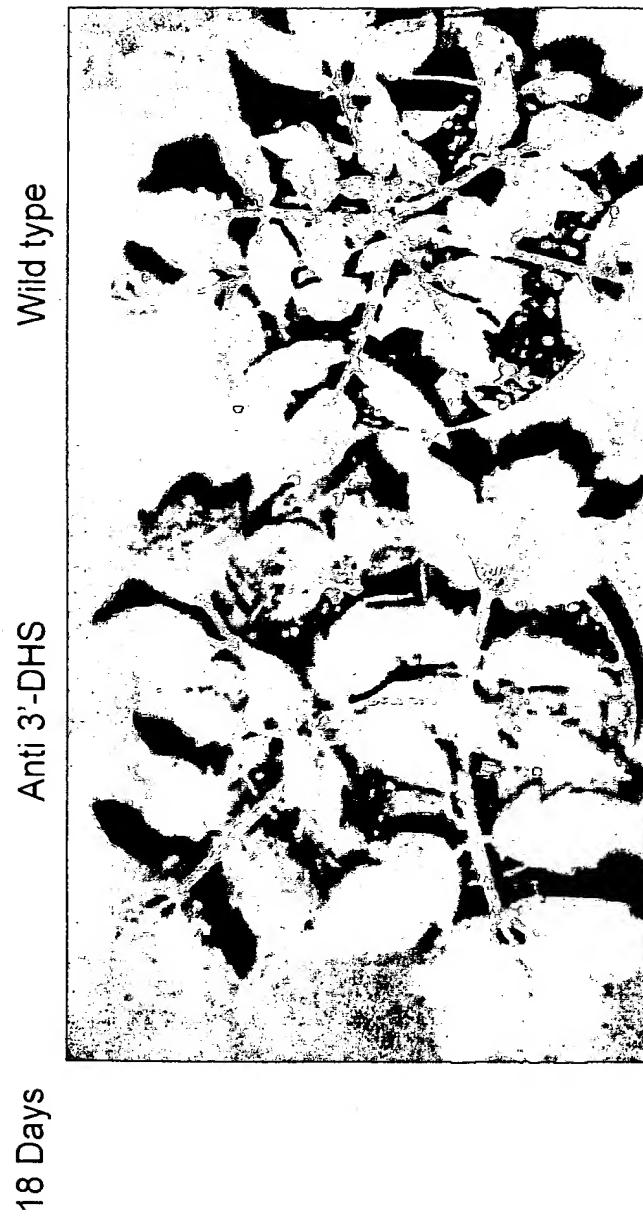


FIG. 26



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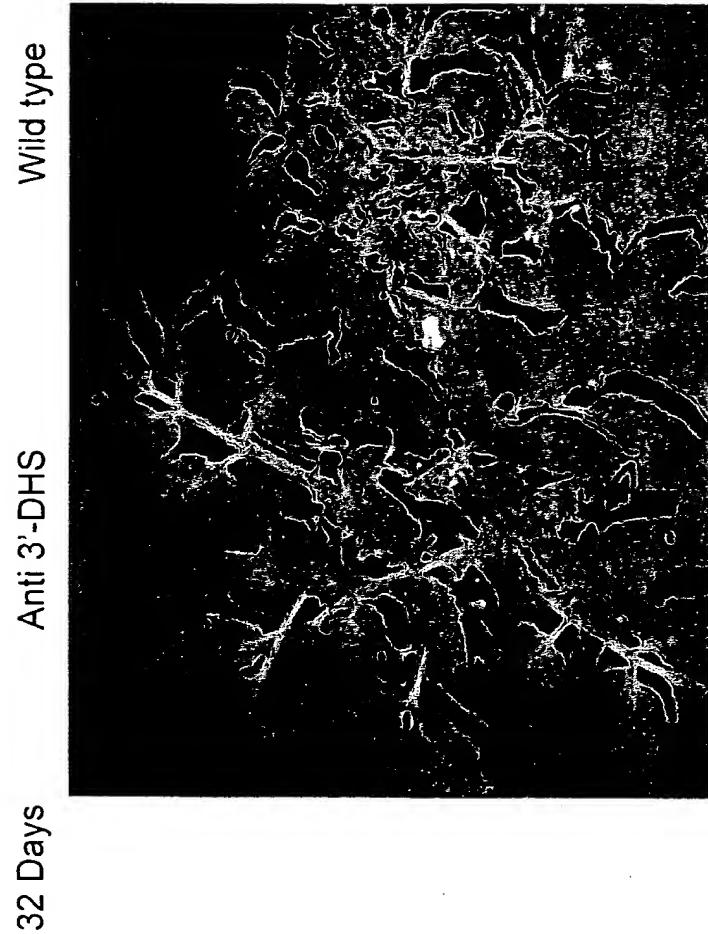


FIG.27



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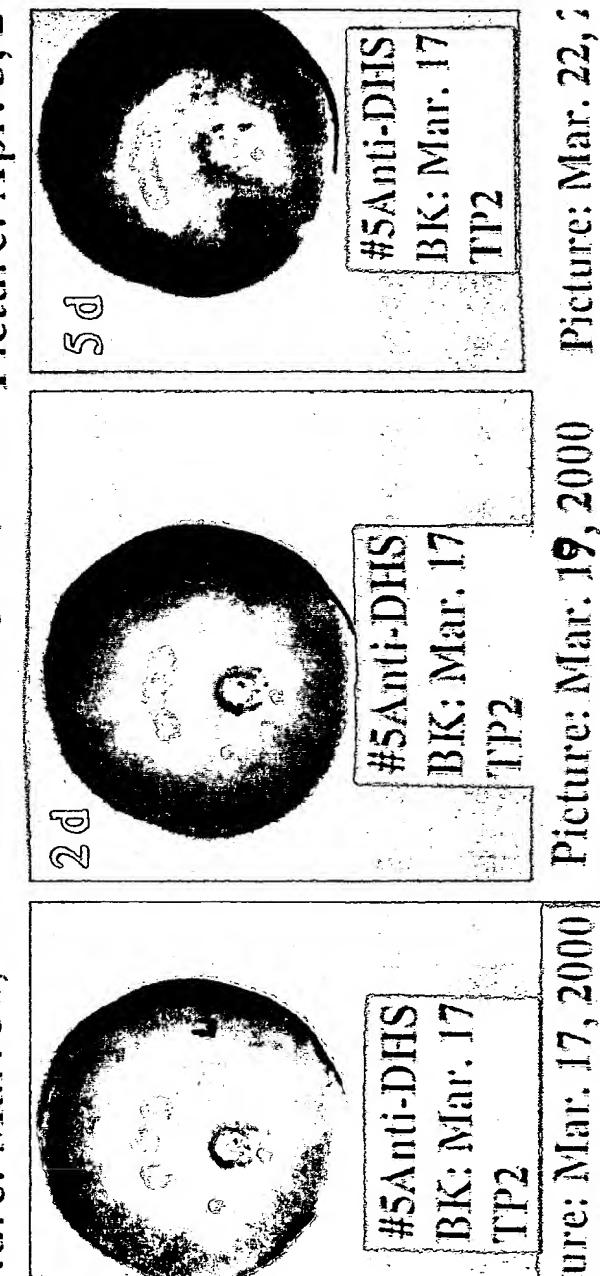
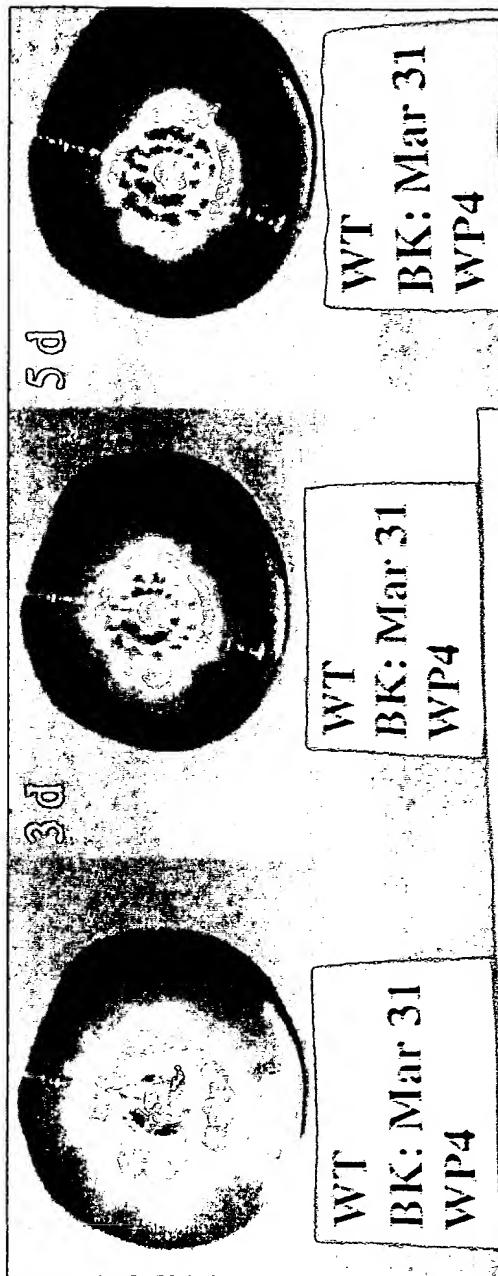
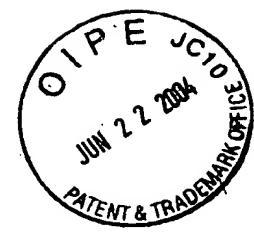


FIG. 28



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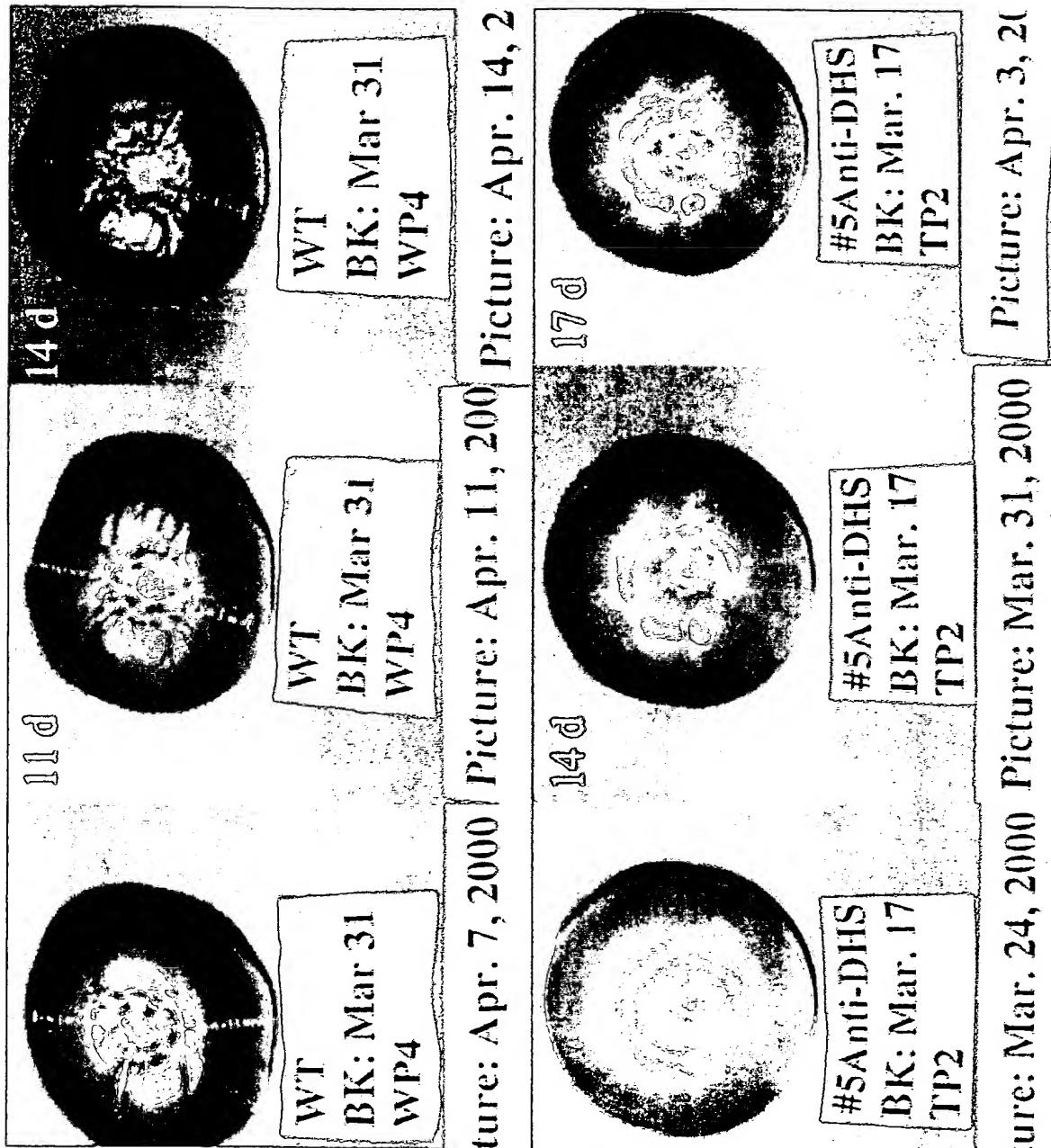
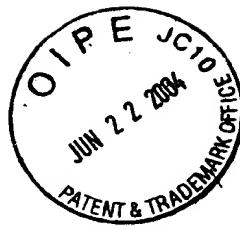


FIG. 29



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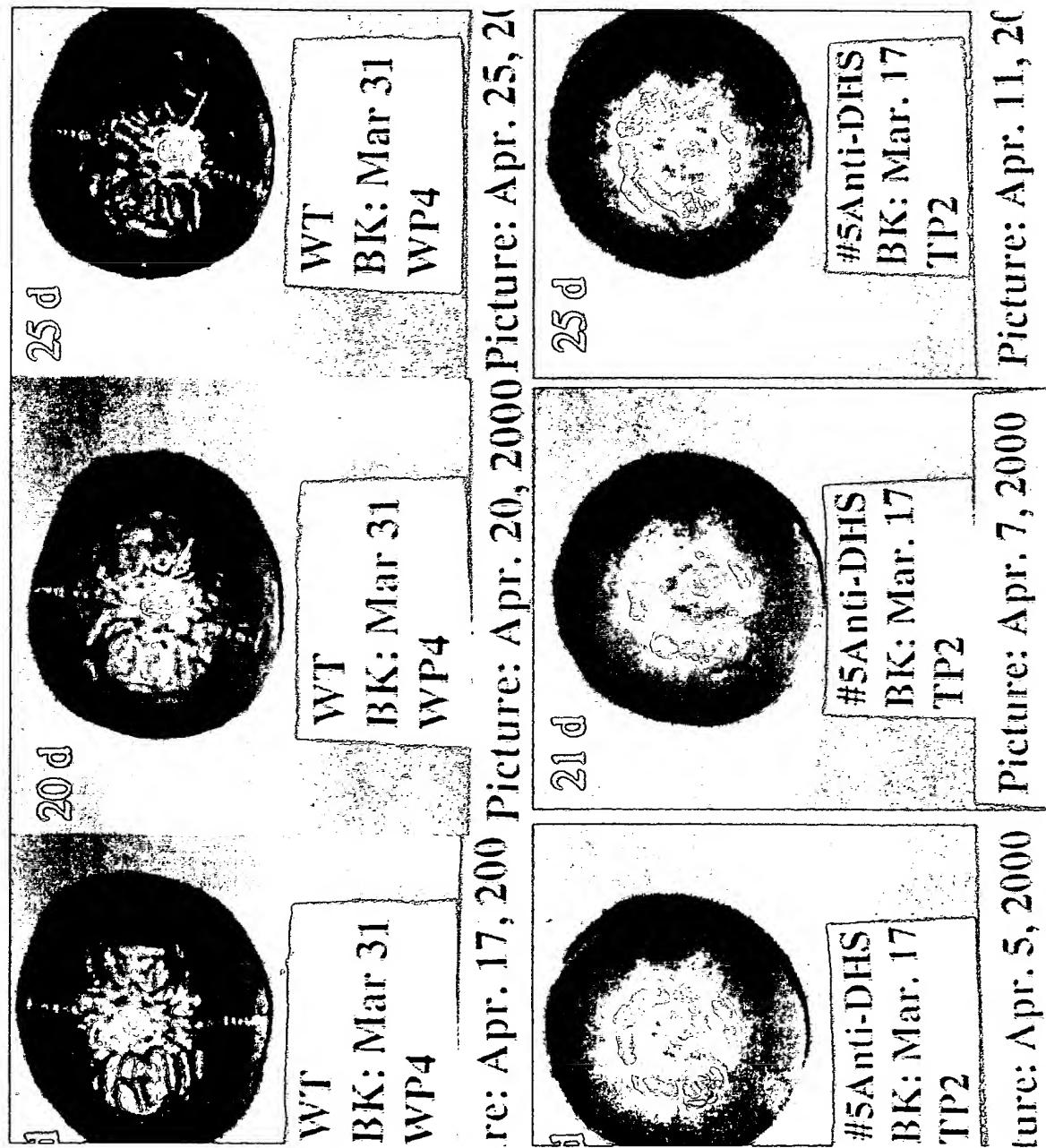


FIG. 30



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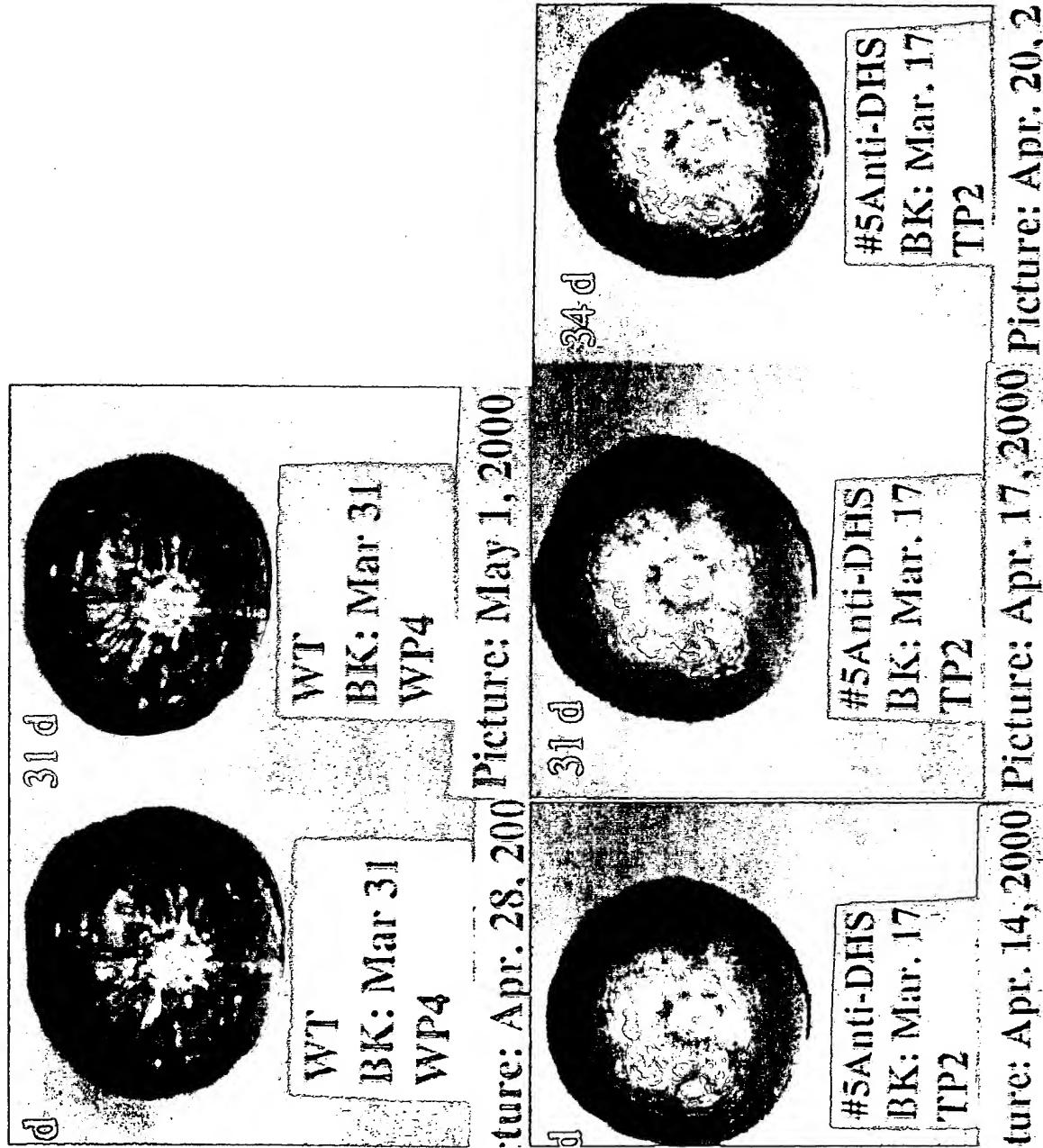


FIG. 31



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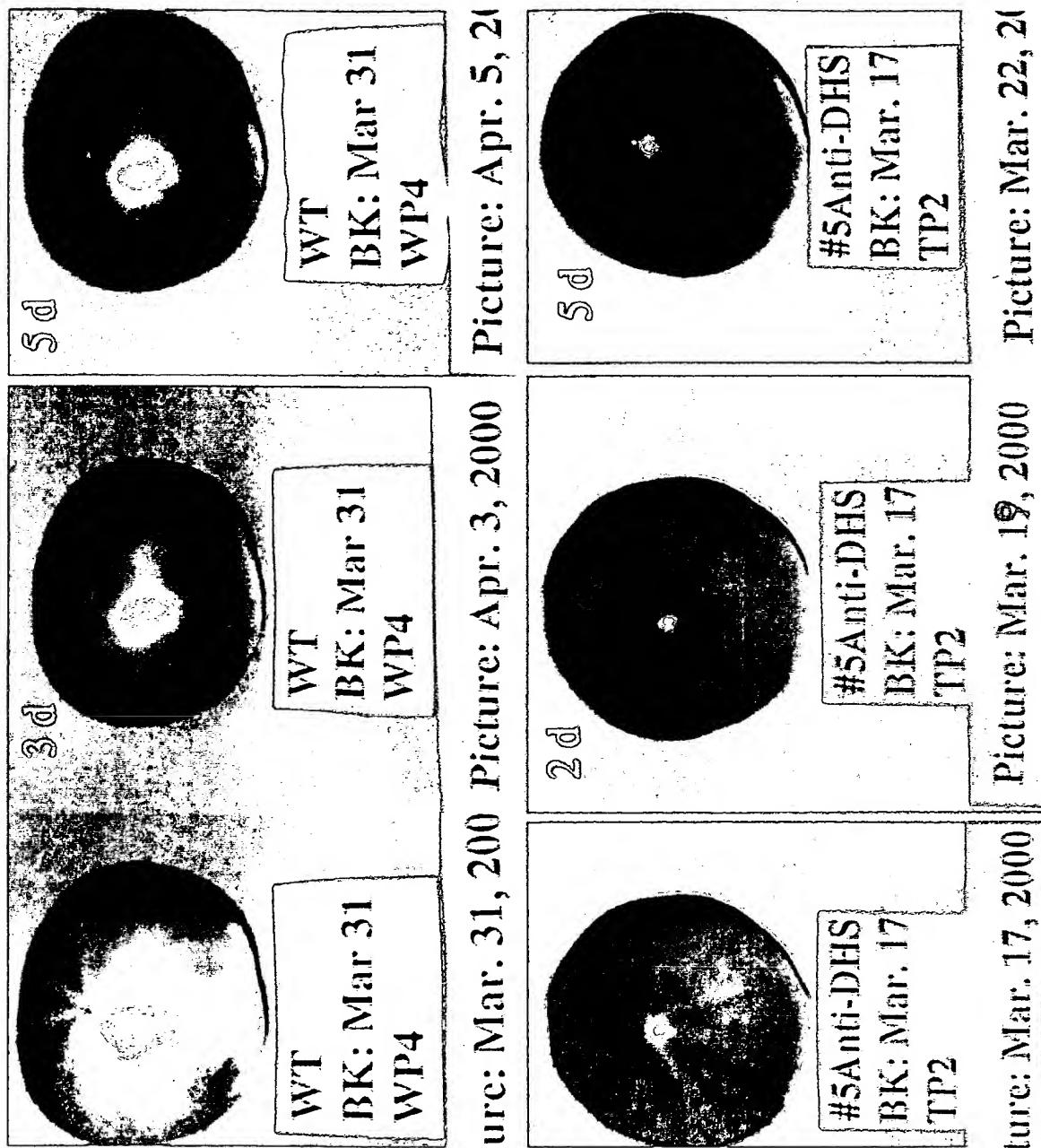
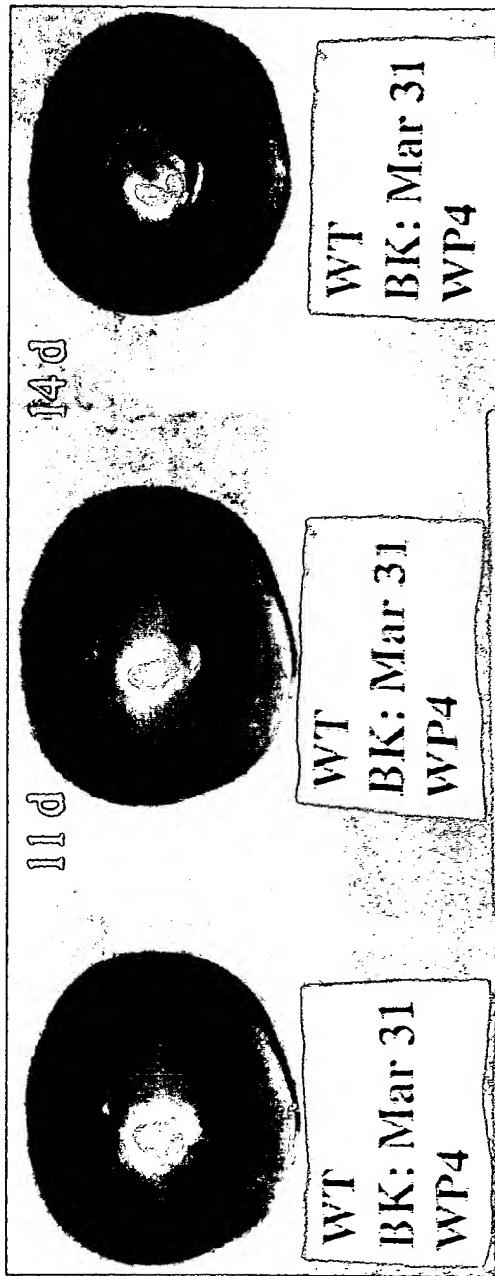


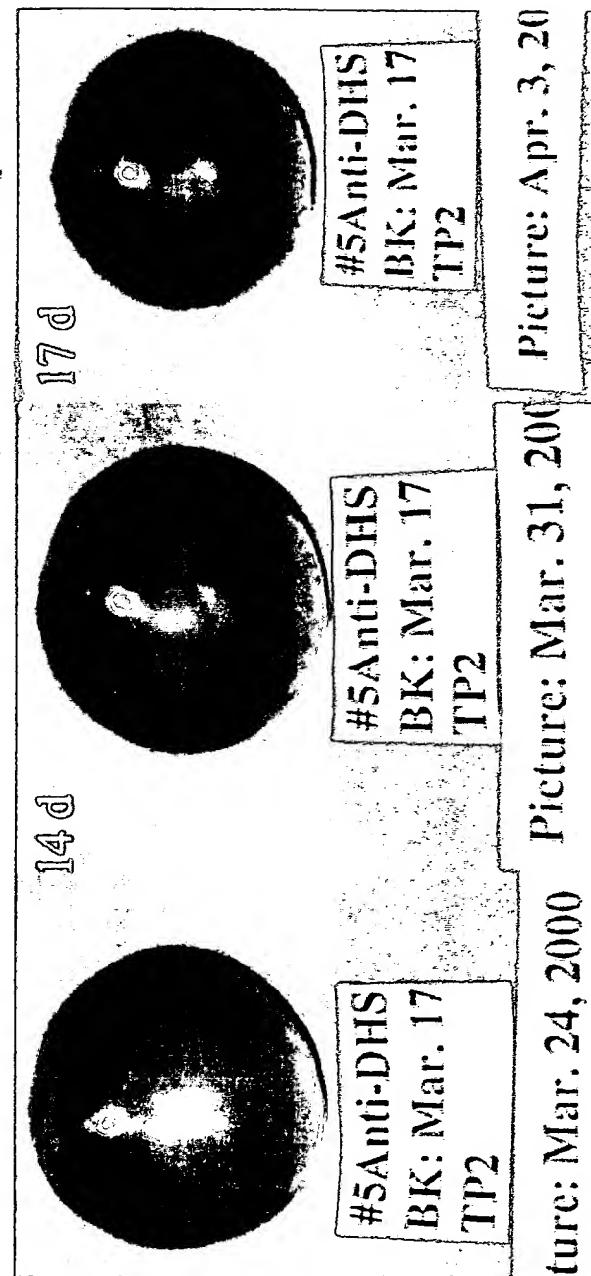
FIG. 32



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ture: Apr. 7, 2000 Picture: Apr. 11, 2000 Picture: Apr. 14, 2



ture: Mar. 24, 2000 Picture: Mar. 31, 2000 Picture: Apr. 3, 2000

FIG. 33



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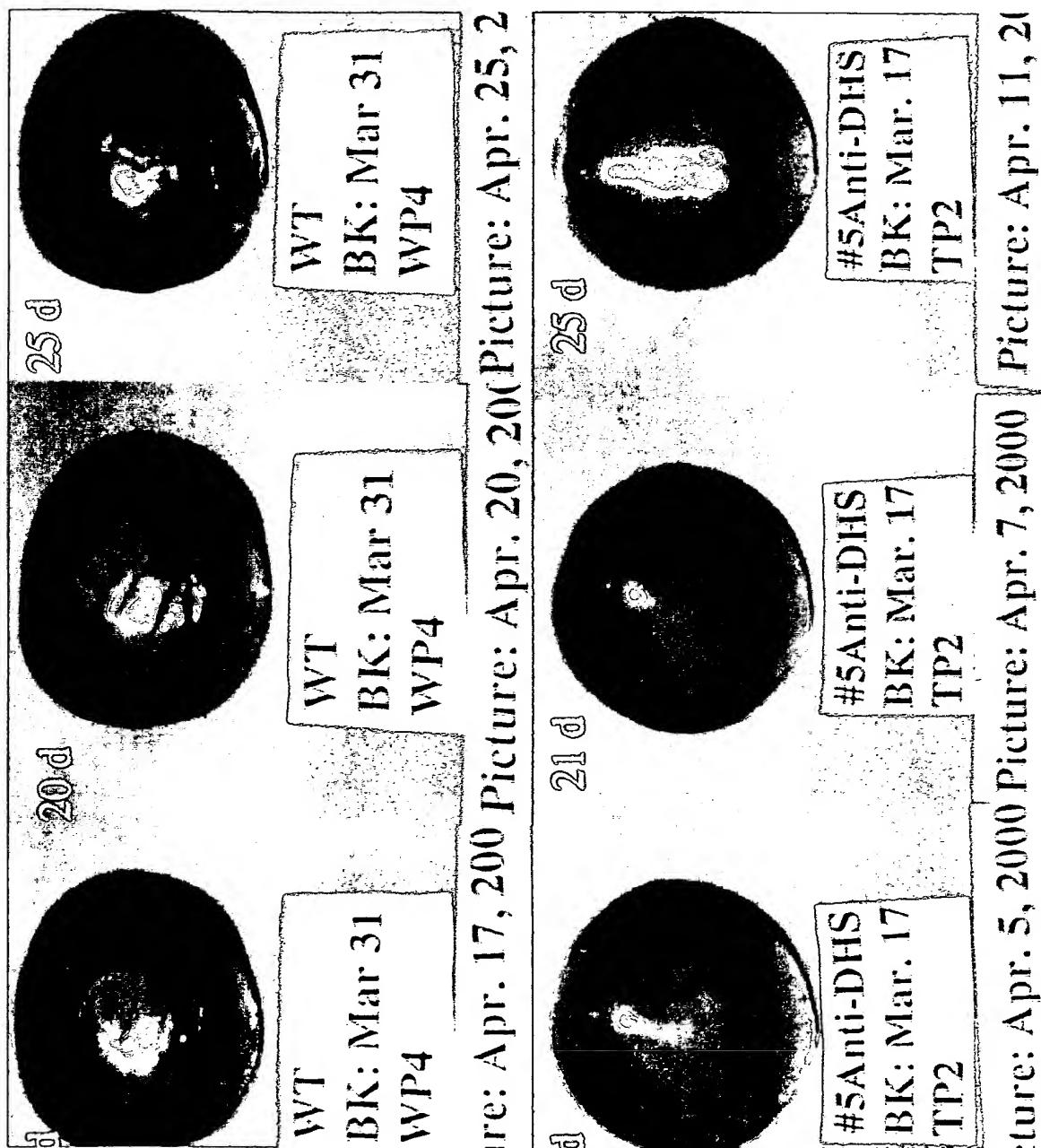


FIG. 34



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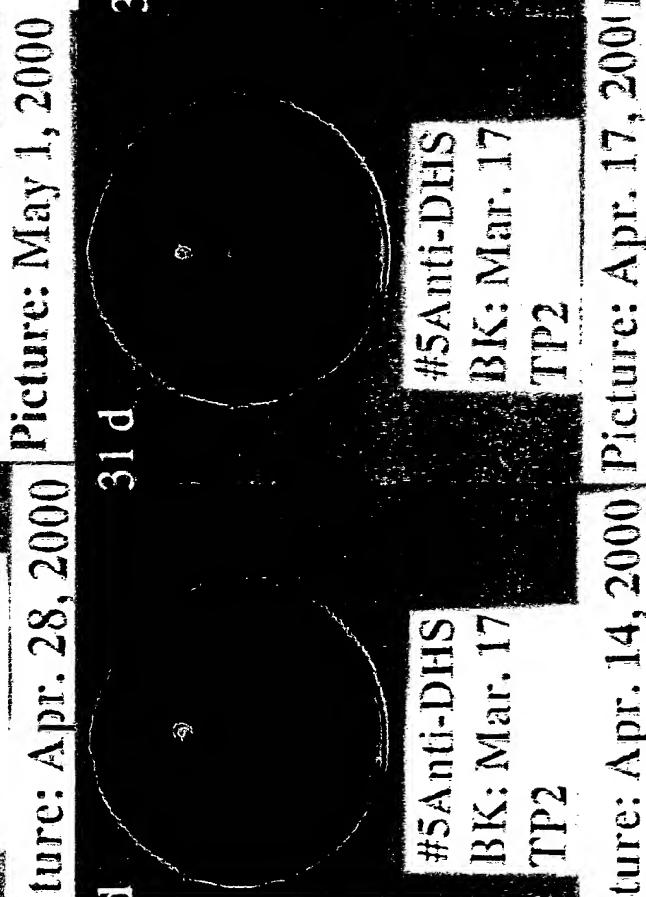
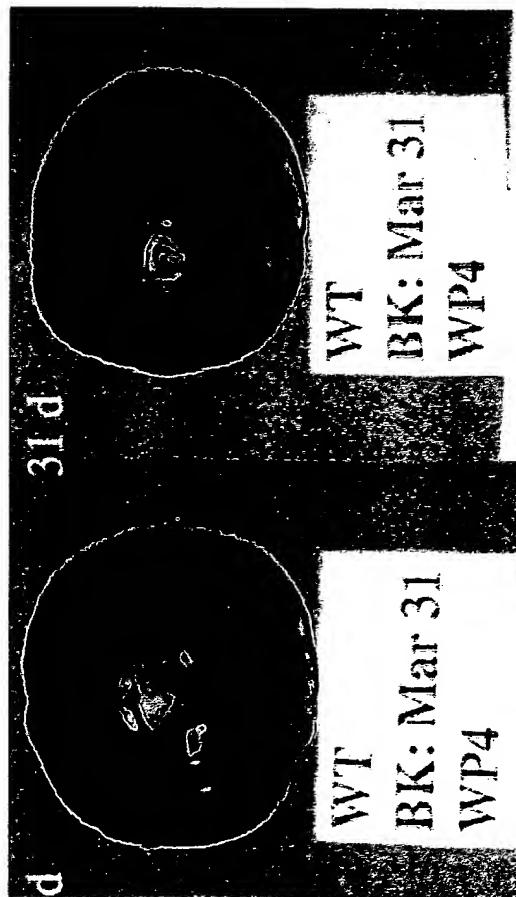


FIG. 35



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Arabidopsis 3'-end DHS for antisense

Nucleotide and derived amino acid sequence

TGCACGCCCTGATGAAGCTGTCTTGGGGTAAAATTAGGGGTTCTGCTAAAACCGTTAAGGTCTGCTTTT
A R P D E A V S W G K I R G S A K T V K V C F

TAATTTCTTCACATCCTAATTTATATCTCACTCAGTGGTTTGAGTACATATTTAATATTGGATCATTCTT
L I S S H P N L Y L T Q W F

GCAGGTATACTGTGATGCTACCATAGCCTTCCATTGTTGGTTGCAGAAACATTGCCACAAAGAGAGACC
AAACCTGTGAGTCTAAGACTTAAGAACTGACTGGTCGTTTGGCCATGGATTCTAAAGATCGTTGCTTTT
TGATTTACACTGGAGTGACCATATAACACTCCACATTGATGTGGCTGTGACCGAATTGTCTTGC
ATTGTACTTTAGTTCTCTAACCTAAAATGATTGCAGATTGTGTTTGC
TAGTCAATAATCCTTGCCTTATAAAATTATTCAAGTTCCAACAAAAAAAAAAAAAA

Nucleotide sequence

TGCACGCCCTGATGAAGCTGTCTTGGGGTAAAATTAGGGGTTCTGCTAAAACCGTTAAGGTCTGCTTTT
TAATTTCTTCACATCCTAATTTATATCTCACTCAGTGGTTTGAGTACATATTTAATATTGGATCATTCTT
GCAGGTATACTGTGATGCTACCATAGCCTTCCATTGTTGGTTGCAGAAACATTGCCACAAAGAGAGACC
AAACCTGTGAGTCTAAGACTTAAGAACTGACTGGTCGTTTGGCCATGGATTCTAAAGATCGTTGCTTTT
TGATTTACACTGGAGTGACCATATAACACTCCACATTGATGTGGCTGTGACCGAATTGTCTTGC
ATTGTACTTTAGTTCTCTAACCTAAAATGATTGCAGATTGTGTTTGC
TAGTCAATAATCCTTGCCTTATAAAATTATTCAAGTTCCAACAAAAAAAAAAAAAA

ARPDEAVSWGKIRGSAKTVKVCFLISSHPNLYLTQWF

FIG. 36



Tomato 3'-end-Deoxyhupsine synthase used for antisense

Nucleotide and derived amino acid sequence

GGTGCTCGTCCCTGATGAAGCTGTATCATGGGAAAGATACTGGTGGTGCCTGAAAGGTGCATTGTGATGCAAC
G A R P D E A V S W G K I R G G A K T V K V H C D A T

CATTGCATTTCCATATTAGTAGCTGAGACATTGCAGCTAAGAGTAAGGAATTCTCCAGATAAGGTGCCAAGTTGAA
I A F P I L V A E T F A A K S K E F S Q I R C Q V

CATTGAGGAAGCTGTCTCCGACCACACATATGAATTGCTAGCTTTGAAGGCCAACTTGGCTAGTGTGCAGGCACATTTA
TTCTGAAACTGACTAGAGGCGGGTATATTCTACCCCGAGTTAGACGACATCCTGTATGGTCAAATTAAATT
TTTCTCCCTCACACCATGTTATTAGTTCTTCGAAGTGAAGAGCTTAGATGTTCATAGGTTTGATTGAATT
ATGTTGGAGGTTGGTGAATACTGACTAGTCCTTACCATATAGATAATGTATCCTTGACTATGAGATTGGTGTGT
TTGATACCAAGGAAAATGTTGGAAACAAATTGGATTTTAATTAAATTGNTTAAAAAAATGGNTTAAAAAA

Nucleotide sequence

GGTGCCTGCTGATGAAGCTGTATCATGGGAAAGATACTGGTGGTCCAAGACTGTGAAGGTGCATTGTGATGCAAC
CTATTGCAATTCCCATATTAGTAAGCTAGACATTTGCAGCTTAAGAGTAAGGAAATTCT

TCCTCAGATAAGGTGCCAAGTTGAACATTGAGGAAGCTGTCTCCGACCACACATATGAATTGCTAGCTTTGAAGCCA
ACTTGTCTAGTGTGCAGGCACCATTTATTCTGCAAAACTGACTAGAGAGCAGGGTATATTCCCTCTACCCCCGAGTTAGACGAC
ATCCTGTATGGTCCAATTAAATTATTTCTCCCTTCACACCATGTTATTAGTTCTCTCGAAAGTGAAGAG
CTTAGATGTCATAGGTTTGAATTATGTTGGGTTGGTGTAACTGACTAGTCCTCTACCATATAGATAATGTATCC
TTGTACTATGAGATTGGGTGTGTTGATACCAAGGAAAATGTTTATTTGGAAAAACATTGGATTTTAATTAAAAA
AAATTGNTT AAAAAAAAAA

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600 bp Arabidopsis Deoxyhypusine Synthase Probe

Primer1 (underlined)

GGTGGTGTGAGGAAGATCTCATAAAATGCCTGCACCTACATTTAAAGGTGATTTCTCTACCTGGAGC
 TTATTTAAG
 G G V E E D L I K C L A P T F K G D F S L P G A
 Y L R
 GTCAAAGGGATTGAACCGAATTGGGAATTGCTGGTCTTAATGATAACTACTGCAAGTTGAGGATTGGA
 TCATTCCC
 S K G L N R I G N L L V P N D N Y C K F E D W I
 I P
 TCTTGACGAGATGTTGAAGGAACAGAAAGAGAAATGTGTTGTGGACTCCTCTAAACTGTTAGCACGG
 CTGGGAAAA
 I F D E M L K E Q K E E N V L W T P S K L L A R
 L G K
 GAAATCAACAATGAGAGTTCATACCTTATTGGGCATACAAGATGAATATTCCAGTATTCTGCCAGGGTT
 AACAGATGG
 E I N N E S S S Y L Y W A Y K M N I P V F C F G L
 T D G
 CTCTCTAGGGATATGCTGTATTTCACTCTTCTGACCTCTGGCCTCATCATCGATGTAGTACAAGATA
 TCAGAGCTA

 S L R D M L Y F H S F R T S G L I I D V V Q D I
 R A
 TGAACGGCGAAGCTGTCCATGCAAATCCTAAAAAGACAGGGATGATAATCCTGGAGGGGGCTTGCCAAAG
 CACCACTA
 M N G E A V H A N P K K T G M I I L G G G L P K
 H H I
 TGTAATGCCAATATGATGCGCAATGGTGCAGATTACGCTGTATTTATAAACACCGGGCAAGAATTGATGG
 GAGCGACTC
 C N A N M M R N G A D Y A V F I N T G Q E F D G
 S D S
GGGTGCACGCCCTGATGAAGC
 G A R P D E
 Primer 2 (underlined)

FIG.38



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483 bp Carnation Deoxyhypusine Synthase Probe

GAAGATCCATCAAGTGCCTTGACCCACTTCAAAGGCGATTTGCCTTACCAAGGAGCTCAATTACGCTCC
AAAGGGT

R R S I K C L A P T F K G D F A L P G A Q L R S
K G

TGAATCGAATTGGAATCTGTTGGTTCGAATGATAACTACTGTAAATTGAGGATTGGATCATTCCAATT
TTAGATA

L N R I G N L L V P N D N Y C K F E D W I I P I
L D

AGATGTTGGAAGAGCAAATTTCAGAGAAAATCTTATGGACACCATCGAAGTTGATTGGTCGATTAGGAAGA
GAAATAA

K M L E E Q I S E K I L W T P S K L I G R L G R
E I

ACGATGAGAGTTACACTTACTGGGCCTTCAAGAACAAATTCCAGTATTTGCCAGGTTAACAGAC
GGCTCAC

N D E S S Y L Y W A F K N N I P V F C P G L T D
G S

TCGGAGACATGCTATATTCATTCTTCGAATCGGGTTAACATCGATGTTGTGCAAGATATAAGA
GCAGTAA

L G D M L Y F H S F R N P G L I I D V V Q D I R
A V

ATGGCGAGGCTGTGCACGCAGCGCCTAGGAAAACAGGCATGATTACTCGGTGGAGGGTTGCCTAACAC
CACATCT

N G E A V H A A P R K T G M I I L G G G L P K H
H I

GCAACGCAAACATGATGAGAAATGGCGCCGATTATGCTGTTTCATCAACACCG
C N A N M M R N G A D Y A V F I N T

A full-length cDNA clone was obtained by screening a carnation
senescent petal cDNA library with this probe.

FIG.39



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Blossom end rot

Normal

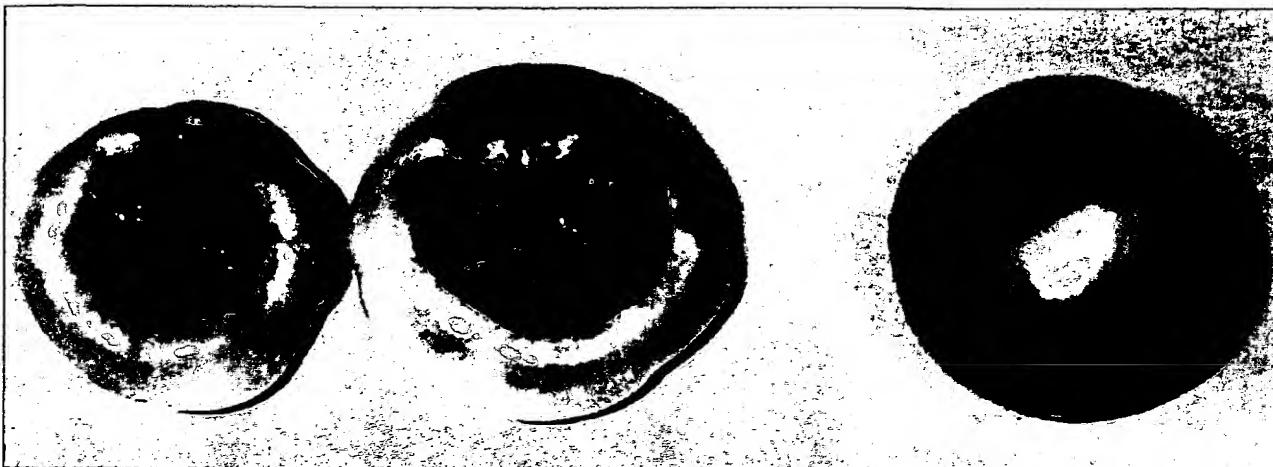


FIG.40A

Blossom end rot

Normal

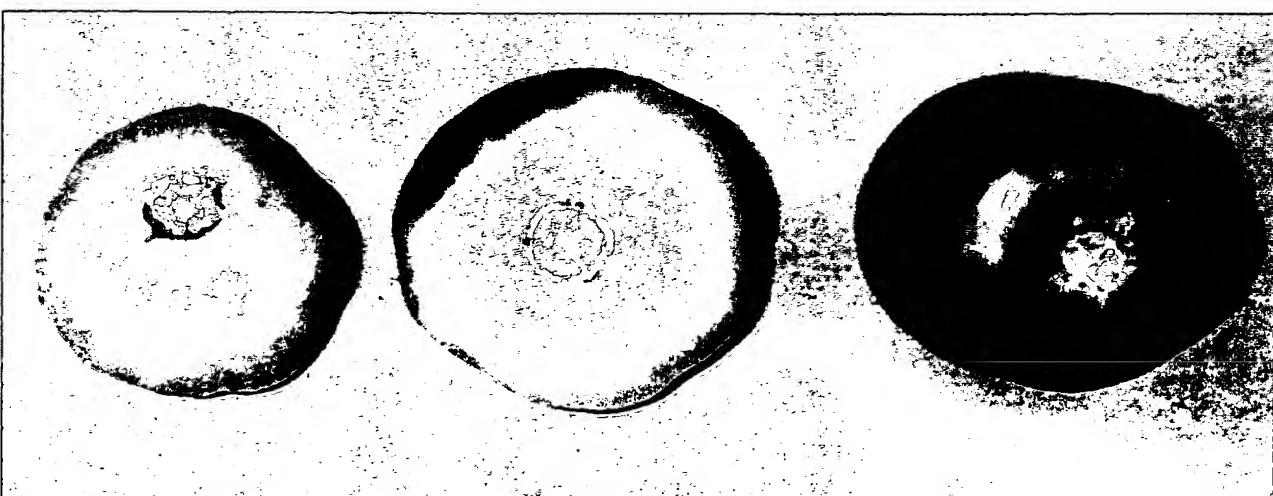


FIG.40B